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SPORTMEN'S ENCYCLOPEDIA

VOLUME I

SPORTSMEN'S ENCYCLOPEDIA

VOLUME I

Compiled by

WILLIAM A. BRUETTE

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Acknowledgment is made and appreciation is expressed to the various correspondents of FOREST AND STREAM whose writings have been drawn upon in the preparation of this volume.

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GAME
BIRDS
-WJ SCHALDACH-
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2. Bob White Quail
3. Ruffed Grouse.
4. Wilson's Snipe
5 American
Woodcock.

GUNS AND SHOOTING

SECTION I—THE SHOTGUN.

Buying a Gun

Buy the best gun your purse will stand. You will never regret the expenditure of a few extra dollars, for a good weapon will prove a constant satisfaction. Cheap guns are badly balanced, clumsy and difficult to align accurately. They shoot loose, their locks stick, their triggers crawl and their bad workmanship proves an annoyance in many ways. A good gun, honestly built may wear bright from constant use but it will always close tight and strong and shoot hard and true to center. There is added pleasure and great moral assurance in the use of a first-class weapon, as it never fails to give confidence to the user.

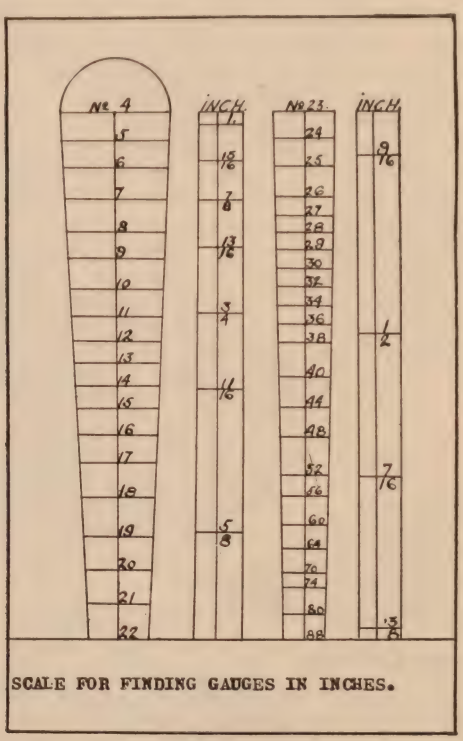
Select a gun according to your uses. For shooting at the trap, geese, brant, duck and other wild-fowl, the 12 with 30 or 32-inch barrels weighing in the vicinity of 7½ lbs. is the standard weapon. For upland game shooting such as prairie chickens, partridge and grouse, the 16-gauge with 28-inch barrels is ideal. It should weigh from 6¼ to 6¾ lbs. For quail and woodcock shooting the 20-gauge with 26 or 28-inch barrels, weight 5½ to 6 lbs., is a graceful weapon that will prove quite as effective as a larger weapon at the distances that these birds are usually killed and in addition is a much faster and more elegant weapon to handle—"Guncraft."

Gauges and Calibers

These are entirely different terms. The diameter of all American rifles are given in decimals of an inch and this designation has been called caliber, a 30 caliber meaning that the rifle has a bore 30/100 of an inch in diameter. On the other hand gauges were not measured in inches but had their origin in muzzle-loading days from the number of spherical balls of lead to the pound, the balls of such a diameter as to enter the muzzle of

the shotgun. In the twelve-gauge, twelve lead balls whose diameter is equal to the diameter of the muzzle weigh one pound; the diameter of a lead ball, sixteen of which weigh one pound, gave us the sixteen gauge, etc.

The diagram shown will give you a sufficiently close approximation to the gauge if you know the diameter in



SCALE FOR FINDING GAUGES IN INCHES.

inches, or vice versa, if you know the gauge you can find its approximate diameter in inches. The gauges are numbered from 4 to 88. To the right of each gauge column you have the inch column given in fractions.

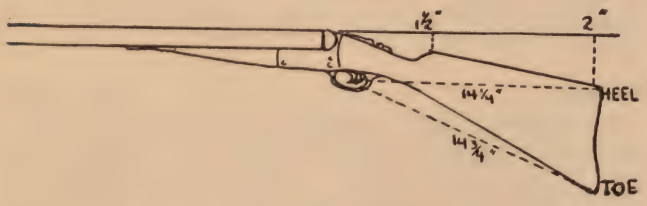
To show how it works, let us assume we know the

gauge of our gun and desire to know what its diameter is in inches. Take, for example, the 28-gauge shotgun. Lay a ruler on the line 28 on the gauge scale and note where this line extended to the right strikes the inch scale. At once we see that our gauge is between ½ and 9/16 of an inch in diameter. On closer inspection we see that our 28-gauge line divides the distance between ½ and 9/16 approximately 3/5 of the distance above the ½. This space between ½ and 9/16 represents 1/16 of an inch. 3/5 x 1/16 = 3/80; therefore ½ plus 3/80 = 43/80 inches, which is the diameter of our bore. Reduced to a decimal fraction 43/80 is equal to .54 (This is very close to the true value, .55).

Now assume that you have run across an old shotgun the diameter of which at the muzzle is 69/100 of an inch, and you want to know its gauge. On the inch scale we find that 69/100 is just a hair over 11/16, so that for our purpose we can accept the gauge nearest to 11/16. Extend the line 11/16 to the left until it cuts the gauge scale and we read the nearest gauge, which is 14.

Gun Measurements

The ordinary measurements are as follows: First, the length of stock. This is the distance from the front trigger of a two-trigger gun to the butt plate. In the case of a single-trigger gun it is usual to take the measure-



ments from a point midway between both triggers of a two-trigger weapon. The drop is the distance the top of the gun stock is below the level of the rib, and it is taken in two places, at the comb and at the butt. It is a very important measurement as guns shoot high or low as they may be straight or well bent. The cast-off is the

deviation of the stock to the right or left of the line of the center of the barrels. The average dimensions of guns carried by the trade run from 13⅞ to 15 inches in length with drop of from 1¼ to 3½ inches.

—"Guncraft."

Selecting a Gun

In selecting a gun from stock first decide upon the gauge and weight and do not forget that most men overweight themselves with needlessly heavy weapons. Then throw the gun up to your shoulder two or three times without aiming at anything in particular. If it comes up easily and strikes the shoulder squarely without special effort and seems to be under good control, select a mark 30 feet or thereabouts distant slightly higher than the shooter's shoulder, look steadily at this object with both eyes open, throw up the gun and directly it is in position against the shoulder, close the left eye and upon sighting the rib determine if the sight on the muzzle is covering the mark. Repeat this maneuver several times and if on each occasion the gun covers the mark it should be tried on others at various distances and elevations. If these marks are all accurately covered the gun may be considered a fit. If, however, the gun is found to aim consistently above the mark, the stock is either too long or too straight. If it comes up below the mark it has too much drop or is too short. It is always better to have a gun shoot high, therefore, be partial to the long, straight stock—"Guncraft."

Balance

The balance of a gun is ordinarily determined by balancing it on the edge of the hand two or three inches in front of the trigger guard. This, however, means absolutely nothing as a gun can be made to balance any place, simply by weighing the stock with lead if it is muzzle heavy or lightening it if it is otherwise.

A gun that is correctly balanced is so fashioned that the weight and metal are distributed principally about the breech and action, where it is needed to withstand the shock of explosion. This also places the weight between the two hands when the gun is grasped in the usual way.

Each, therefore, bears its proportion of weight which permits of rapid handling and complete control. It gives a gun what is commonly referred to as "feel," which means that a properly constructed gun weighing 7 lbs. feels lighter in the hand and is more easily handled than a crudely built weapon of a pound or more less weight.—

Determining the Drop of a Gun

Go out by yourself, tack a large sheet of paper to a barn, a solid board fence or other background, mark a bull's eye in the center of the sheet, step back 25 paces, look steadily at the mark with both eyes open. Throw up the gun and fire instantly without hesitating or taking time to prove your aim. If the load is not placed close to the center something is wrong either with the gun or the shooter. If, as a result of successive shots, some of the loads land below the mark, some above and others to the right and left, the trouble is with the shooter and he will have to spend considerable time practicing until he can hit a stationary mark regularly. If the result of several shots discloses that they are nearly all going high, the shooter may consider that he is aiming right, but the gun is too straight for him and he should try one that has more drop both at the comb and butt or one that is not quite so long in stock as a long stock has the tendency to make the user shoot high. If, on the contrary, the shots are uniformly low, then the shooter should try a gun that has less drop or is a trifle longer in the stock.

Pistol Grip

The pistol grip is an advantage on heavy duck guns of large gauge, as it enables the user to hold the gun more firmly against the shoulder. It is also useful on magazine guns which are held in a fixed position while several shots are being fired.

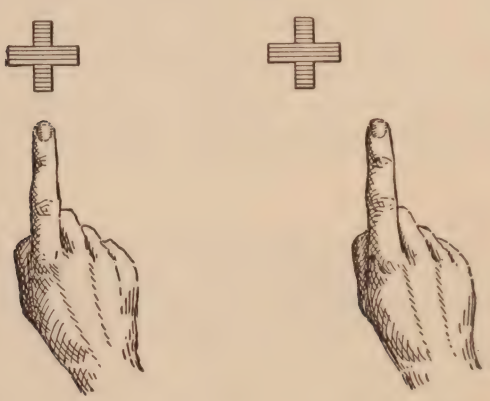
Straight Grip

For upland shooting with guns of light or medium weight the straight grip is better than a pistol grip as it allows the hand greater freedom of motion and enables

the weapon to be brought to bear more rapidly in a variety of directions. The tendency of progressive American shooters is towards the straight grip stock.

Master Eye

Although the right and left eye are usually of the same size and appearance, they are seldom of equal strength. One eye is invariably stronger than the other, dominates all visual impression and is known as the master eye. It can be determined as follows: Hold an ordinary finger ring about two feet away from the face and with both eyes open locate some small object four or five yards distant; do not move the ring from its position, but close the left eye, and if the right eye continues to see the object centrally through the ring, then the right eye is the stronger, or master eye; continuing further, if the right eye be closed and the sight of the left eye be continued through the ring, it will rest considerably to the right of the object which was in line of vision with both eyes open or the left eye closed. If the left eye is the master



eye, after the object has been brought into view through the finger ring with both eyes open, with the closing of

the right eye alone the object will still remain in view, but where the left eye is closed and the line of sight through the ring is continued by the right eye alone, it will rest some distance to the left of the object which was in view with both eyes open and the right eye closed.

Another method of testing to find which eye is the master eye is to stand facing an object, say a bird, tree or similar object if out doors, a light, picture, etc., if in doors, and pointing steadily at it with one finger, the arm being outstretched and both eyes open, alternately close each eye. It will be found that, when aiming with the master eye, the finger will be dead on the mark, whereas, if it should be the poor eye, the finger will be pointing several inches to one side.

It is, therefore, evident that a man who shoots a gun from the right shoulder with the rib in line with the right eye, but whose left eye is the stronger is looking across his gun barrels at an angle and would naturally shoot considerably to the left of any object at which he might aim with both eyes open. The remedy for the man whose left eye is the stronger is to shoot from the left shoulder or have a gun with a turn in the stock that would bring the rib in line with his left eye.—Bruette.

Velocity

The speed of the shot when it strikes the game, is the most important factor in determining the killing power of a charge. It is customary, however, in ballistic work to compare the velocities of different loads by comparing the average velocities over a given range. A good distance for this purpose is the standard shotgun patterning range of 40 yards.

The accompanying table gives the average velocity in foot seconds, over a range of 40 yards, for each of the commonly-used twelve-gauge field or trap loads. All the figures are averages taken over a considerable interval of time and show the velocities obtained with Smokeless Shotgun powder in factory loaded shells.

TABLE OF VELOCITIES—12-GAUGE LOADS

Shot Size Soft or Chilled	3 Drs. 1 Oz.	3 Drs. 1⅛ Oz.	3 Drs. 1¼ Oz.	3¼ Drs. 1⅛ Oz.	3¼ Drs. 1¼ Oz.	3½ Drs. 1⅛ Oz.	3½ Drs. 1¼ Oz.
2	994	974	954	1014	994	1054	1034
3	976	956	936	996	976	1036	1016
4	957	937	917	977	957	1017	997
5	938	918	898	958	938	998	978
6	919	899	879	939	919	979	959
7	900	880	860	920	900	960	940
7½	891	872	851	911	891	951	931
8	882	862	842	902	882	942	922
10	844	824	804	864	844	904	884

This table shows at a glance the average velocity over hunting ranges of every commonly used twelve-gauge smokeless powder factory loaded shell. It can be used for a comparison of the probable effectiveness of different loads and sizes of shot used with different loads of powder. By examining it, we can see at a glance the different velocities obtained by different sizes of shot. It is quite desirable to have a table of patterns at hand to use when making these comparisons. A table of this kind arranged to correspond with the velocity table follows:

TABLE OF SHOT PATTERNS

No. of shot in pattern ⅞ Oz.	2	3	4	5	6	7	7½	8	10
	Sizes of Shot								
No. shot in charge	75	93	116	147	191	255	302	350	742
40%	30	37	46	58	76	102	120	140	296
60%	45	55	69	88	114	153	181	210	445
75%	53	70	85	110	143	191	227	263	557

No. of shot in pattern 1 Oz.	2	3	4	5	6	7	Sizes of Shot 7½	8	10
No. shot in charge	86	106	132	168	218	291	345	399	848
40%	34	42	52	67	87	116	138	159	339
60%	51	63	79	100	130	174	207	239	508
75%	65	80	92	126	164	223	259	300	636
1⅛ Oz. No. shot in charge	97	119	148	189	245	327	387	449	954
40%	38	47	59	75	98	130	154	179	381
60%	58	71	88	113	147	196	232	269	572
75%	73	90	111	142	184	245	290	337	716
1¼ Oz. No. shot in charge	107	132	165	210	272	364	431	499	1060
40%	42	52	66	84	108	145	172	199	424
60%	64	79	99	126	163	218	258	299	636
75%	80	116	124	158	204	273	323	374	795

By examining this we can determine the average pattern made with any of the commonly used sizes of shot by guns of 40, 60 and 75 per cent patterning ability.

Penetration

This factor combined with patterning qualities, determines the killing value of a load. The word "penetration" is a variable term. When we refer to the penetration of shot we mean the penetration in the flesh of game. This, of course, cannot be standardized, due to the different sizes of the various varieties of birds and small animals and the different quantities of feathers and skin that cover their bodies. We must, therefore, fall back on soft pine wood as a basis of measurement. It would serve no useful purpose to list the penetration of a large number of loads because the difference in penetration in wood would be so small, in most cases, that the variation in the hardness of different testing blocks would be sufficient to make it practically impossible to compile a perfectly accurate table for 20 or 30 charges. In the accompanying tabula-

tion are given results of Winchester tests with 3¼ drams of Bulk powder and 1¼ ounces of 4, 6 and 7½ shot, the penetration being in soft pine at 40 yards.

PENETRATION TABLE

12 Gauge

3¼	1¼	4's	Penetration 0.56 inch
3¼	1¼	6's	Penetration 0.50 inch
3¼	1¼	7½'s	Penetration 0.44 inch

When using 3¼ drams of bulk smokeless and 1¼ ounces of shot, 4's have a 27% advantage in penetration over 7½'s and a 12% advantage over 6's. 6's have a 14% advantage over 7½'s. With different loads of powder or quantities of shot, slightly different results would be obtained.

12-gauge, 35 yards, 1⅛ oz. No. 7 shot

In looking at our velocity table we see that a load of 3¼ drams of bulk powder and 1¼ ounces of No. 4 shot have an average velocity over 40 yards of 957 foot-seconds. This is only 38 foot-seconds or 4 per cent. more than is obtained with the same quantity of 6's, yet it brings a 12 per cent. advantage in penetration at 40 yards. To offset this, the 6's have a 65 per cent. advantage in pattern. This explains clearly why it is that such a high percentage of duck hunters prefer 6's to 4's for all wild-fowl shooting excepting for very long-range shots, where 6's no longer give sufficient penetration to kill properly.

A 65% advantage in pattern, provided the penetration is sufficient to make clean kills, surely outweighs a 12% advantage in penetration plus a 4% advantage in velocity. This last-mentioned figure represents approximately the advantage in leading a quartering shot at this range, when using the larger-sized pellets. It does not, however, give a true idea of the constantly increasing value of using larger shot at the longer ranges.

Another use of the velocity table is to show the uselessness of trying to obtain high velocities at long range by using heavy powder charges with very fine shot. The powder charge of 3½ drams and 1⅛ ounces of No. 8 gives an average velocity of 942 f. s. The same load develops a velocity of 944 f. s. with No. 10's, Either of these charges is a good stiff load. With 4's, 5's, or 6's, it is a humdinger on ducks. But yet, this charge of 8's reaches the target no faster than a 3 drams 1 ounce charge of 5's, which can be shot comfortably from a featherweight field gun held in one hand. The heavy load of 10's is still worse, being no faster than the 3 drams 1 ounce load of 7's. At a range of a few yards, it will blow a quail to bits or drill a two-inch hole through an inch board, but at 50 yards or over it is about as effective as the Peace Treaty. In addition, the heavy shot will show much greater penetration and killing power in proportion to their average velocities. The remaining velocity is higher and the pellets are heavy enough to use it most effectively.—Landis.

Sixteen-Gauge

This gauge is especially designed for the field-shot of conservative ideas who likes a light-weight piece. When built to average dimensions, it combines much of the power and range of the 12-gauge with a good share of the light weight and snappy handling qualities of the 20. For these reasons it makes a very satisfactory weapon for a hunter, whose sport does not contain too high a percentage of long-range duck-shooting and who is not a trap-shooter.

16-gauge, 25 yards, 1 oz. No. 7½ shot

Its average field-loads of 2½ drams 1 oz. and 2½ drams ⅞ oz. correspond almost exactly in velocity with the 3 dram 1⅛ oz. and 3⅛, 1⅛ oz. charges in the 12. The difference in shot charges is not enough to give the wide difference in density of patterns that is always observable between the common field loads in the 12 and the 20. In addition a 6¾ to 7-pound 16-gauge is almost the ideal weight of field-gun for many men to carry. It is heavy enough to hold steadily and is not so heavy that it is likely to become a burden in hot weather or when hunting in hilly country.

16-GAUGE VELOCITY TABLE

Results secured over a range of 40 yards with factory-loaded shells.

Shot Size Soft or Chilled.	2½ Drs. ¾ Oz.	2½ Drs. ⅞ Oz.	2½ Drs. 1 Oz.	2¾ Drs. ⅞ Oz.	2¾ Drs. 1 Oz.
2	1011	991	971	1031	1011
3	993	973	953	1013	993
4	973	953	933	993	973
5	955	935	915	975	955
6	937	917	897	957	937
7	918	898	878	938	918
7½	908	888	868	928	908
8	899	879	859	919	899
10	862	842	822	882	862

By comparing this table with the 12-gauge tabulation, we can form definite conclusions as to the relative killing-power of the various 12- and 16-gauge loads. In making this comparison we will use No. 7½ shot in field-loads. A charge of 2½ drams and ⅞ oz. of shot develops a velocity over 40 yards of 888 foot-seconds. In the 12-gauge it is equalled by the 3 dram 1 oz. load, which gives us a velocity of 891 foot-seconds. The 12-gauge charge has an adantage of ⅛ oz. of shot which gives it a 15 per cent. advantage in killing-power. The respective killing-powers of two loads of shot of equal size compare as the patterns, if the velocities are equal. This is true irrespective of the gauges in which they are fired.

The 2½ 1 oz. load of 7½'s develops 868 foot-seconds velocity. It is equalled by the 3 dram 1⅛ oz. 12-gauge load, which is credited with 872 foot-seconds. The 12, however, has a 13 per cent. advantage in killing-power on account of the greater density of pattern.

In heavier loads we will use No. 6 shot as a basis of comparison, as they are the size most commonly employed in charges of this nature. The 2¾ dram ⅞ oz. 16-gauge load goes down the line at the rate of 957 foot-seconds. This is a snappy load. It develops 18 foot-seconds more than the 3¼ 1⅛ 12-gauge load, but the 12

has a 29 per cent. advantage in pattern. In velocity it would be about equal to a load of 3¼ 1 oz. or 3⅜ drams 1⅛ oz. in the 12. It is a good duck load in the 16 but is one-third less powerful than the 3½, 1⅛ load in the 12.

The 2¾ dram, 1 oz. 16-gauge charge, the heaviest one commonly supplied in factory loads, which are what 99 per cent. of us use, develops 937 foot-seconds with 6's. This load gives us 919 foot-seconds or 18 less, when used in the 12. As it is a heavy-powder, heavy-weight-of-shot load, it should be compared with the 3½, 1¼ oz. 12-gauge load, which develops 959 f. s. velocity with 6's. In addition to being 22 foot-seconds faster, this 12-gauge duck load has a 25 per cent. advantage in pattern and an even greater advantage in killing-power, because energy increases as the square of the velocity and directly as the weight of the shot charge.

The 3¼, 1⅛ oz. 12-gauge load is 2 foot-seconds faster than the 16-gauge load mentioned and has a 12 per cent. advantage in pattern.

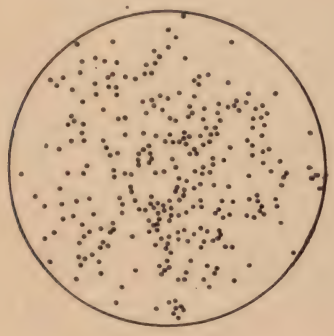
From these figures we see that, on the average, 12-gauge field-loads are very slightly faster and from 13 to 30 per cent. more powerful than corresponding loads in the 16. This means that the shooter of the smaller gauge contends against this handicap when competing with the 12 or when using a 16 in place of a 12. The big-gun shooter can use this advantage in pattern in either of two ways: In denser patterns in guns of equal choke, or in wider patterns of the same density as those given by the 16. In other words, a strongly modified choke 12 shoots just as close patterns as a full choke 16 and at the same time gives the shooter a larger pattern to use in connecting with the game. In addition to this a modified choke pattern is usually more evenly distributed at the outer edge of the pattern than one fired from a full-choke gun of any gauge. There is, therefore, less chance of a missed, crippled, or mangled bird on a moderately well-held shot.

In field-shooting, therefore, the shooter of the 16 has an advantage of about one pound in weight of gun, an additional advantage in weight of ammunition carried and a consequent gain in speed in getting on rapidly-moving objects. As a result he gains a slight advantage in

yardage on snap-shots. On the other hand he is always shooting against a 13 or 30 per cent. advantage in pattern and consequent killing-power of the 12.

Twenty-Gauge

The 20 is undoubtedly superior to the 12 in the ease with which you can get on a rapidly moving mark, especially when exhausted, and is a much more beautiful weapon. It is a very fine weapon for anyone who likes to carry as little hardware as possible in the field and who can shoot well enough to place a full-choke pattern on most of his birds.



20-gauge, 20 yards, ¾ oz. No. 8 shot

There is the same difference between the 20-gauge and the 12 as there is between a trout rod and a bass rod. When choosing a gun, it is well to remember whether you require graceful handling and quick action under difficulties, or whether you must have a wide, well-filled pattern, or must deliver a heavy load of shot where it will do the most good. These conditions should decide the selection of the gauge and the load to be used.

20-GAUGE VELOCITY TABLE

Shot Size, Soft or Chilled	2 Drs. ¾ Oz.	2¼ Drs. ¾ Oz.	2¼ Drs. ⅞ Oz.
2	951	991	971
3	933	973	953
4	913	953	933
5	895	935	915
6	877	917	897
7	858	898	878
7½	848	888	868
8	839	879	859
10	802	842	822

By the table we see that a charge of 2 drams of powder and ¾ of an ounce of 7½ shot develops a velocity of 848 foot-seconds. By looking back at our 12-gauge velocity table we find that a 3 dram 1⅛ oz. load of 7½ hustles along at the rate of 872 foot-seconds. One of 3 drams 1 oz. develops 891 foot-seconds, and even a charge of 3 drams 1¼ oz. goes down the range for 851 foot-seconds. In other words, every 12-gauge charge on the list above 2¾ drams will outshoot this 20-gauge load for velocity. In addition the 12 has an advantage of exactly 50 per cent. in pattern when using the same size shot, considering 1⅛ ounces as a load for the 12-gauge and ¾ of an ounce as the load for the 20-gauge, as they are the commonly used high-velocity loads in factory charges.

On paper the 1⅛ ounce 12-gauge load has an advantage of 50 per cent. in pattern over the ¾ oz. charge in the 20.

On acount of the limitations of patterning of the 20, it is not advisable to modify the bore to any considerable extent or else holes will appear in the pattern that are large enough to allow small game to be missed on perfectly held shots.

In the matter of penetration, the load that develops the highest velocity will show the greatest penetration in objects that are easily penetrated and up to certain limits. We cannot, however, prove that because a load delivers 10 per cent. higher velocity than another that it will show an equal advantage in penetration, or that it might not show a greater advantage in penetration in the flesh of

game, in paper, wood or any other medium of comparison.

Comparative Penetration in Soft Pine at 40 yards.

Gauge	Load	Size of Shot		
		4	6	7½
12	3¼-1¼	0.56″	0.50″	0.44″
20	2¼- ⅞	0.50″	0.37″	0.25″

As will be noticed, the 12-gauge out-shoots the 20 with 4's, 6's and 7½'s. The advantage is 12 per cent. in the case of 4's and a much higher percentage in the case of smaller shot. The 20-gauge is no joke when loaded with 2¼ drams of powder and ⅞ of an ounce of 6's, 7's or 7½'s. You have good velocity and fairly close patterns, well bunched in the center, as are most 20-gauge patterns, and they can be put on birds so quickly with a 6 or 6½-pound gun that the shooter usually kills or misses his game before the user of a heavier 12-gauge gun can aim and shoot. At 15 to 30 yards such a load makes clean kills without reducing the game to hamburger, and from 10 to 30 yards is the distance at which the vast proportion of upland small game is killed. This refers particularly to cotton-tail rabbits, quail, woodcock and ruffed grouse. For every 75-yard kill that is made on quail, a dozen shots will be missed in brush or briar patches at 5 to 15 yards, and so we can conclude that the 20 shoots hard enough and close enough to get the average or even the average long shot in field shooting. —Landis, *Forest and Stream.*

Chokeboring

This term is applied to a constriction in the barrel of a gun at or near the muzzle for the purpose of improving both the pattern and the penetration of the weapon. Guns are referred to as being cylinder bored, improved cylinder, modified choke and full choke. The cylinder bore, as its name indicates, is a true cylinder from the end of the cone of the cartridge chamber to the muzzle. The improved cylinder is one that has a constriction at the muzzle of from three to five-thousandths of an inch; the modified choke has a constriction of from eight to ten thousandths of an inch and a full choke from twenty to thirty thousandths of an inch. Most gunmakers place

the choke at the muzzle; others place it a few inches back from the muzzle and then relieve or enlarge the barrel to the muzzle. Others gradually taper the barrel from the breech to the muzzle. The recess cylinder or jug choke is simply an enlargement of the barrel a short distance from the muzzle. For close patterns and long-

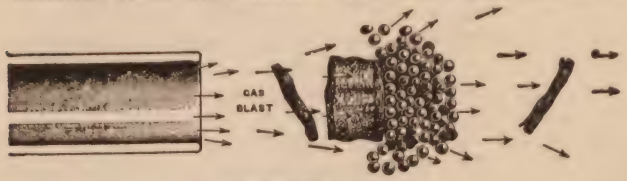


FIG 1b. TRUE CYLINDER.

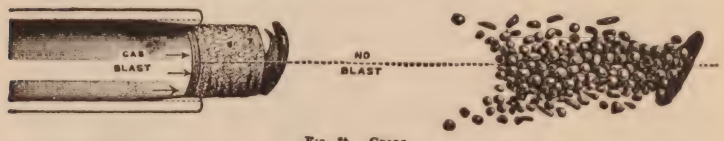


FIG. 2b CHOKE.

FIG 3b RECESS CYLINDER

range shooting the full choke gives the best results. For ordinary field work and medium range duck shooting the modified choke will prove most satisfactory; for short range brush shooting the improved cylinder is recommended. Many sportsmen have the right barrel of their guns bored modified choke and the left barrel full choke.

Recoil

Recoil is the retrograde motion imparted to a gun by the pressure resulting from the explosive force of the gas generated by the explosion of a charge of powder. It varies in proportion to the weight and character of the powder charge employed and the size and weight of the shot charge, the character of the wadding, the pressure under which it has been loaded and the crimp

over the shot charge. In the case of modern powders, standardized to give a definite pressure and velocity, the actual amount of recoil experienced by the shooter is mainly effected by the weight of the gun he is using, therefore, if he finds the recoil of one cartridge excessive, it is advisable for him to diminish the effects on the shoulder by utilizing a cartridge containing a small charge. A few grains less of powder and an eighth of an ounce less shot will have a very appreciable influence without materially affecting either the range or pattern of his gun or its effectiveness in the field.—"Guncraft."

Comparative Loads

Ballistite and Infallible are "dense" and E. C., Dupont and Schultz are "bulk" smokeless shotgun powders.

This distinction is important because a smaller quantity of a dense powder will produce a given explosive force than would be required with a bulk powder. Bulk smokeless powders and black powders are loaded by measure and dense powder by weight. If a shooter who was accustomed to measuring three-dram loads of bulk smokeless or black powder made the mistake of using the same load of dense powder, the results might be disastrous.

Now that factory loaded shells are almost universally used, and that those who still load their own shells understand the different powders, this danger is practically eliminated. For most shooting, dense and bulk give equally satisfactory results and a choice between them is a matter of individual preference. However, if shells are to be stored in very damp climates, or exposed to excessive moisture, those loaded with Infallible or Ballistite are preferable because Infallible and Ballistite are absolutely waterproof, while any bulk powder will absorb a certain amount of water.

The comparisons in the table below show the commonly used loads of Infallible and Ballistite, both by weight and by measure, with the E. C., Dupont, Schultz, Dead Shot and Black Powder loads of corresponding strengths. If you are shooting 3 drams of any one of the aforesaid Bulk Smokeless or Black Powder, you will readily see

by referring to the table that the equivalent load of Ballistite or Infallible is 24 grains.

Ballistite and Infallible	Weight in Grains	Measure in Drams	Equivalent in Strength to
28 Gauge Loads	14 grains or ¼	dram ..1¾	drams Bulk Smokeless or Black Powder
	16 grains or ⅞	dram ..2	drams Bulk Smokeless or Black Powder
24 Gauge Loads	16 grains or ⅞	dram ..2	drams Bulk Smokeless or Black Powder
20 Gauge Loads	16 grains or ⅞	dram ..2	drams Bulk Smokeless or Black Powder
	18 grains or 1	dram ..2¼	drams Bulk Smokeless or Black Powder
16 Gauge Loads	18 grains or 1	dram ..2¼	drams Bulk Smokeless or Black Powder
	20 grains or 1⅛	drams..2½	drams Bulk Smokeless or Black Powder
12 Gauge Loads	20 grains or 1⅛	drams..2½	drams Bulk Smokeless or Black Powder
	22 grains or 1¼	drams..2¾	drams Bulk Smokeless or Black Powder
	24 grains or 1⅜	drams..3	drams Bulk Smokeless or Black Powder
	25 grains or 1⅞	drams..3⅛	drams Bulk Smokeless or Black Powder
	26 grains or 1½	drams..3¼	drams Bulk Smokeless or Black Powder
10 Gauge Loads	26 grains or 1½	drams..3¼	drams Bulk Smokeless or Black Powder
	28 grains or 1⅝	drams..3½	drams Bulk Smokeless or Black Powder
	30 grains or 1¾	drams..3¾	drams Bulk Smokeless or Black Powder

Handling a Gun

After you have secured a gun that fits you, proceed to get accustomed to it. Keep it in your room or office and pick it up whenever you have an opportunity and throw it to your shoulder, pointing it at small objects with both eyes open and afterwards closing one eye to ascertain whether you are holding it right. Get a hand trap and have an assistant throw clay birds for you, not too fast at first, and get accustomed to aligning them over your sights rapidly. Do not forget to hold well over straight away targets as they usually are rising and swing well ahead on cross shots. Remember that the targets you lose are lost by shooting behind them. It is almost impossible to swing too far ahead of a crossing bird. A good place to practice is over a sheet of water as that will show you where your shots are going.—"Guncraft."

First Lesson in Learning to Shoot

Go out by yourself where you can put up some object about the size of your hat, say some twenty yards away. Then take your position and commence to throw up your gun to your shoulder, and, keeping your eyes open, see how near you can bring the bead in line with your eye and the object at the instant that the butt-plate touches your shoulder. Try this a few times and then rest a few

minutes. Then try again, but do not fatigue yourself. After you can throw the gun on to the mark with your

eyes open, shut up both eyes and throw the gun to your shoulder in the same manner as before, and the instant that you feel the butt touch your shoulder open both eyes

and see where your gun is pointed. Keep up this practice until you can throw your gun into line with any object that you may select, whether it is above, below or on the same level with your eyes.

Second Lesson in Learning to Shoot

After you are perfected to a satisfactory degree in the practice of throwing your gun up to some object, take a piece of paper about two feet square, and with some tacks fasten it up on an old barn or other building, where you will do no damage, and then step back twenty or thirty steps and load your gun, and hold it in position with the muzzle toward the ground at an angle of about forty-five degrees. Fix your eyes on the target, shut both eyes and instantly throw up your gun and fire, keeping your eyes closed until after the discharge. If your practice has been faithfully performed before this, you will probably find the paper riddled with shot, and if you do not, you will readily see where the charge did strike, which will help you to remedy it at the next fire. When you can hit that paper (with a moderate degree of certainty) with your eyes closed you have more than "half the battle," for you have mastered the "hang" of the gun, and the rest is comparatively easy.

How to Carry a Gun

The safest way is over the right shoulder, with muzzle pointing well up. The handiest way when game may be flushed is in the "hollow" of the left arm. Never carry it so that it points toward yourself, your friend or your dog.

Precaution in Shooting

Never in excitement nor in fun point it toward any human being. Never carry it so that if accidentally discharged it would endanger the life of a dog even. Always think, when walking, which way your gun is pointed, and if a companion is in the field with you, no matter how near and how temptingly the game appears, do not shoot until you know just where he is, and that a stray shot may not possibly strike him, for one little pellet is sufficient to destroy an eye forever. Never get into a wagon

without taking the cartridges from the gun. Never get over a fence without either taking the cartridges out or placing the gun through the fence on the ground, so that if you fall or the fence breaks, it cannot be discharged. Always carry the gun at Safe. Never get in front of it yourself. If you see you are about to fall, drop the gun so the muzzle will be from you. Occasionally a cartridge will stick after it has been fired. A stout, thin blade of a knife will generally extract it, if not remove the other cartridge, and then cut a straight stick and poke it out from the muzzle; but even then do not place your body in front of it, but content yourself with using the hand.

WING SHOOTING

Shooting on the wing is a mechanical art like billiard playing, boxing, or fencing. There will, of course, be degrees of excellence; but any one with the full use of his faculties and the ambition necessary to attain success in anything, can acquire it. The secret lies in the hand becoming subservient to the eye. Let out a bird from a trap before 500 persons, and they will all see it, but only the practiced shot can throw up a gun to his shoulder with accurate aim and a simultaneously pulled trigger before it has flown 10 feet. A sportsman should shoot game the same as an Indian shoots his arrow, by looking at the object with both eyes open. It may be done by closing one eye, but there is nothing gained by it. There are two ways of shooting on the wing. One, to throw up the gun to the shoulder and pull the trigger at the same moment, termed "snap shooting." The other, equally good, and better to begin with, and more certain upon the whole, particularly in open shooting, is to follow the bird, and when covered, fire while the gun is in motion. But when you pull the trigger the other hand has a tendency to stop; that misses the bird. But education will teach it not to stop, the same as we teach both hands a different action while playing on the piano.

Confidence in Wing Shooting

You must have confidence in yourself. Make up your mind that you will get the first bird that starts; and when

one does start, if you can see him, let him have it, if there is even a ghost of a chance of killing him.

Quickness in Wing Shooting

To acquire quickness in wing shooting, practice using the gun fifteen minutes daily in the house. Practice throwing it up to your shoulder, hammer down, both eyes open, and pointing at any small object in the room. Then look with one eye along the barrel to verify your correctness of aim; then follow two imaginary birds, first to the left, then to the right, pull the trigger at some object in passing, and see that the motion of following is not checked.

Flight of Birds

The process of normal flight may be considered to be due to two influences—the muscular effort of elevation, and the muscular relaxation of sliding down an inclined plane, which view may tend to simplify the explanation ventured on. When the bird flashes down the wing at *A* (Fig. 1), the body is thereby raised to a higher level

FIG. 1.—UNDULATORY COURSE OF FLIGHT

at *B* than the end of the previous slope in the air, and at the next step the wings are held out horizontally while descent is begun down a short inclined plane, *BC*, where they have become relaxed, and are now pointed upward. On arriving here another flash of the wings is made downward, and the bird rises to *D*, at the summit of the next slope, when again the wings are extended horizon-

tally, when relaxation begins, and terminates at the bottom of the incline at *E*, where they are let go, and elevated previous to the next muscular effort. This method of action may be repeated rapidly, so that there might be continual flapping of the wings indicating short rises and short slopes in progression. Or, again, if the inclines are lengthened out unduly over the rises, an appearance of a bird sailing through the air is produced, when there is a flap only rarely given by the wings. If the wings of a bird seem to be elevated, we may suppose that it is at the bottom of the incline, or with wings depressed we may suppose it to be at the top of the rise. The horizontal

FIG. 2.—ALTERNATE ACTION AND REACTION OF THE WINGS IN FLIGHT

flight of birds with wings observed to be flapping would probably, therefore, consist of a series of undulations, or rises and falls, like the tracings of a sphygmograph, representing circulation or respiration. The up and down flappings of the wings would correspond with the down and up curves of the line of flight, and these again with descent and ascent of the body of the bird, to which it would really tally, and not with the motion of the wings.

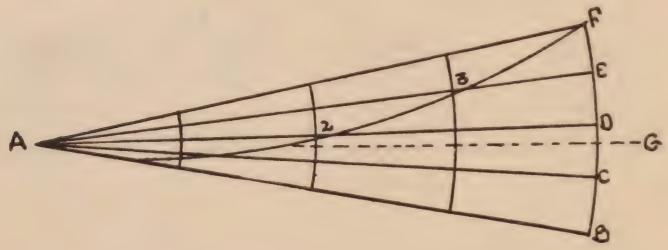
Speed of Birds' Flight

The highest speed of flight per hour of birds in full plumage is estimated as follows: Crow, 25 to 40 miles; mallard, black duck and shoveler, 40 to 50; pintail, 50 to 60; wood duck, 55 to 60; widgeon and gadwall, 60 to 70;

redhead, 80 to 90; blue-winged and red-winged teal, 80 to 100; bluebill, 80 to 110; canvasback, 80 to 120; sparrow, 40 to 92; hawk, 40 to 150; wild geese, 80 to 90. The distance traveled by birds in ⅛ second is as follows: At rate of 5 miles per hour, .92 feet; rate of 10 miles per hour, 1.83 feet; rate of 12 miles, 2.2 feet; 20 miles, 3.66 feet; 30 miles, 5.5 feet; 40 miles, 7.33 feet; 60 miles, 11 feet; 80 miles, 14.66 feet; 90 miles, 16.05 feet; 100 miles, 18.33 feet; 120 miles, 22 feet; 150 miles, 27.5 feet.

Aiming at Flying Game

Some light may be thrown upon the questions of whether to aim at or in front of a bird crossing the shooter, by consideration of the accompanying figure and



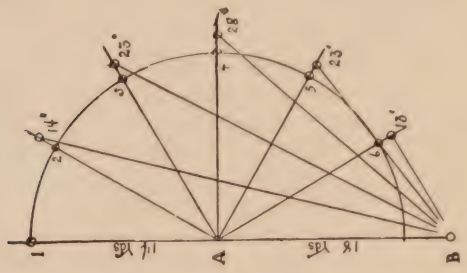
its explanation. *A* is the position of the charge when fired, and *B* that of the bird at the same instant, the latter being supposed to fly from *B* to *F* in exactly the same time that it takes the former to go from *A* to *BF*, the bird's line of flight. If the aim is along *AF* with the gun temporarily at rest, the bird passing *B* at the instant of firing, then the charge strikes the bird at *F;* if along *AB*, with the gun at rest, the bird will reach *F* as the charge reaches *B;* if the aim is along *AB* at the instant of discharge and the gun continues to be held on the bird in its flight toward *F*, the conditions are those of the question principally requiring consideration. Suppose now that the line *AB* represents an indefinitely extended gun barrel,

fired in the position *AB* and swung around with uniform velocity from the instant of discharge, so that when it gets into the position of *AF* the charge reaches the muzzle at *F*, then when the barrel is in the position *AC* the charge will be at 1; when in *AD*, at 2, and when in *AE*, at 3. The points 1, 2 and 3 are those of the curved line through which the charge has to pass from *A* to *F*. Returning to the original conditions: If *A*1 represents the length of the gun barrel (held on the bird flying from *B* toward *F* after being fired with aim along *AB*) the charge leaves it at 1 and flies in the straight line for 1 *G*, which is the resultant of the forward and angular forces and tangent to the curve at 1, and is therefore outside of the path required to carry it to *F*. If any other point of the curve *A* 1 2 3 *F* is taken as the muzzle of the gun, the breech being at *A* in all cases, the result shows the charge crossing the bird's line of flight somewhere between *B* and *F* at the same instant that the bird reaches *F*, and palpably chronicles a missing shot behind the bird. Such successful shots as seem to argue false theory in the foregoing, can generally be accounted for without disturbing it. In some cases the scattering of the shot serves to cover the error in aiming, and in others the gun is discharged just as it "catches up with" the bird, and while it is moving with a rapid angular velocity unintentionally and accidentally correct.

Aiming at Flying Targets

The same laws which rule in the case of clay birds are applicable to live ones, and if the idea of just how to aim at the trap could be well impressed, the shooter would in consequence become more expert in the field. The solution of the question of how to aim ahead is a mathematical one. If the velocities of shot and bird and the distance of the bird from the shooter at the time of firing are known, then the gun must be held at a certain point in order that the center of the load and the bird may meet. The velocity of No. 8 shot is put down at about 900 feet per second. The velocity of clay pigeons

with the trap set in the fourth notch is about 35 feet per second, 1/23 as fast as that of shot. In other words, while shot were moving 23 feet, the clay bird would move 1 foot. The accompanying diagram will give an idea of how far to hold ahead for the various angles a bird



takes in leaving the trap. Let the trap be at A and the shooter at B, and the angles be taken for each 30 degrees which correspond with the notches in the trap. A 1 is a dead away bird, and if it is not caught dodging, a man with average skill can easily demolish it when it reaches the summit of its flight by holding hard on. Earlier the aim must be a little above and later a little below the bird. Next take A 4 which leaves the trap on a line at right angles to the shooter. Let us suppose that when the shooter is ready to fire, the bird is 14 yards from the trap, and the position of the shooter is 18 yards from the trap. The distance of the bird from the shooter is B 4, or say 68 feet. While the shot would be traveling to 4 the bird would move on the line A 4 nearly 3 feet further, and while this 3 feet was being traveled by the shot the bird again moves nearly 2 inches. The amateur who has aimed at the bird gets a nice "goose egg" for his pains. The apparent position of the bird now, as viewed by the man at the score, is approximately 28 inches to the right of the point where seen at the instant of firing. By the same calculation we obtain that the aim must be ahead for the angle as follows:

At 2, 13 inches; at 3, 22 inches; at 5, 22 inches, and at 6, 12 inches. These calculations assume that the bird moves on a line straightaway from the trap, which is not always the case. They frequently make a turn to right or left, and this trick of theirs must be watched closely and aimed for accordingly. For instance, it is easy for a bird which leaves the trap on the line A 2 (see diagram) to start on a curve to the left about the time the shooter is beginning to press on the trigger, and in a very short time it becomes a straightaway bird and must be shot at. Or should it turn to the right the lead must be increased in order to hit it. Allowance must also be made for ascending and descending motion of the birds. And windage is no trifling factor. It is probably the hardest of all to deal with, and on a windy day the crack shots generally have to make excuses for their low scores. Of course, when the word "pull" is given, and the bird is seen to take its course, the shooter has no time to figure out the thing exactly. A glance and a thought is all there is time for, and the situation must be taken in at once. That this can properly be done, this thing of shooting ahead must previously be well fixed in the mind. Success cannot result until this is appreciated.

ART OF SHOOTING

The first principle that the beginner in wing shooting has to grasp is that the apparently instantaneous passage of shot from a gun to the object aimed at, in reality requires a distinct interval of time, during which a rapidly flying game bird will have passed from the position it was in when the trigger was pulled and would thereby escape being hit. Therefore, in shooting on the wing it is necessary to aim a sufficient distance in front of a flying bird to allow for the time the shot will occupy in traversing that distance, this allowance, of course, depending on the speed of the bird and the angle of its flight. At first, the beginner will have to make a mental estimate as to the amount of lead it will be necessary to give each bird to insure its coming within the circle of shot, but as he prac-

tises and progresses, this will require less and less conscious mental effort, and eventually he will be able to throw up his gun, make the necessary allowances and pull the trigger by what is generally termed second nature, but which is in reality the rapid working of the subconscious mind.

In shooting at flying birds some good shots simply bring the gun up quickly and fire into the air ahead of the bird. This is what is known as the pitch-forward system and is practical for men whose mind and finger require but the briefest interval of time for action. The great majority of good shots, however, have adopted what is known as the swing-on system, whereby the shooter keeps his gun moving with the object as he presses the trigger. As a rule, shooters cannot explain just how they swing on a bird, simply because they do not realize what they really do between the time they determine to pull the trigger and the explosion of the cartridge. Some men say they come up from behind a bird and swing ahead, others that they throw onto the bird and then swing ahead, but all agree that to achieve good results the gun must be kept moving.

It has been stated frequently that the mere swinging of the gun is sufficient allowance in the case of a crossing bird, but as a matter of fact, if the bird is in the line of sight at the moment the trigger is pulled, there is a virtual certainty of its being shot behind and missed. If the swing of the gun is arrested at the moment of fire, then it must be pointed considerably in front of the object, but if the swing of the gun is continued after the trigger is pulled and until the shot leaves the barrels, only a very small allowance is required, barely sufficient for the shots to traverse the distance to the object, for the swing of the gun communicates a slight lateral flight to the shot, just as a heavy object thrown from a rapidly moving train does not fly at right angles to the train, but has the train's forward motion communicated to it, as well as the motion of throwing, and therefore assumes the direction of the result of these two forces, outward and onward. So far as accuracy is concerned the swinging-on method has everything in its favor, it also permitting the use of the second barrel without interruption. A great many men who imagine they simply pitch forward and shoot, in

reality swing the gun into position in front of the flying object and pull the trigger, unconscious of the fact they had not checked the gun until after they had shot. A procedure of this kind necessarily reduces the allowance in distance materially, as it would be necessary only to consider the time required for the shot to reach the object. The man, however, who shoots by the pitch-forward system, simply selecting some spot ahead in the bird's flight at which to fire, and doing so without any swing, must allow, first, for the time required by the shot to traverse that distance, then for the time required by his mind to determine how far forward to shoot as well as the time occupied in raising his gun and pulling the trigger, all of which necessitates firing in front a most impractical distance. Another reason for recommending the sportsman to swing the gun in the act of shooting is that it produces a truer alignment on the course covered by the bird, and not only prevents dwelling on the aim with the barrels stationary, but assists unconsciously in estimating more exactly the allowance the bird requires.

The invention of the clay bird has greatly facilitated practice at moving objects and although objected to by some, it is noticeable that the men who condemn it on the ground that it ruins field shooting are as a rule neither good shots at the trap nor in the field, whereas we are unable to recall one good trap shot who is not also a good game shot. We do not mean by this that simply practicing at clay birds will make a man a good game shot, for it will not, as skill in the field and control of the nerves at the sudden flush or rapid flight of game birds can be acquired only by experience. Practice at clay bird shooting, however, will enable a man to acquire a complete and ready control of his gun, so that he can handle it with safety to himself and his friends. It will educate his eye and brain and hand until they work together, giving him a clear insight into the theory of wing shooting and affording him valuable experience in judging speed and distance and estimating the lead it is necessary to give moving objects.

The weak point about clay bird shooting, from a fixed trap as ordinarily conducted, is that the shooter stands in an unnatural position with his gun fast at his shoulder

and usually pointed at the edge of the trap where he knows the bird will appear, the moment he gives the word. These conditions never exist in the field, for there the sportsman does not know from what patch of cover the snipe, grouse or quail he is pursuing may flush, nor has he anything but a general idea as to the speed and direction of its flight, and it is only after the bird is in the air that the gun is raised to the shoulder.

The objections that have been raised to clay bird shooting from the fixed trap are all eliminated by using a hand trap. With one of these inexpensive and handy affairs the different shots that are met with in the field can be simulated under quite natural conditions, as with it birds can be thrown in any conceivable direction. The shooter can walk around a field carrying his gun in a natural position, as if he were out after game, the man with the hand trap following behind or at one side, and from time to time, without warning—other than the noise made by the trap—throw birds either high or low over the shooter's head, quartering to the right or left or at various angles across his front and skimming along the ground. Valuable practice can be obtained also by selecting some open spot in the timber, across which birds can be thrown so that they are only visible for a short interval of time, or the assistant can take up a position on one side of a wall and throw birds over it at various speeds and angles toward the shooter who stands on the other side.

The beauty of clay bird shooting is that it enables a difficult shot to be repeated indefinitely until it is mastered and in the course of an hour more practice can be obtained and more experience acquired in handling a gun than could be gathered by spending a week in the field, for there a difficult shot is seldom repeated and the actual number of shots fired comparatively limited.

The approximate speed of game birds has been determined as sixty feet a second, and singularly, this is also the speed of the clay bird when the spring of the trap is working at full strength and the line of flight approaches the horizontal. The average pace of the clay bird for the first ten feet after leaving a trap is sixty-eight feet per second, this agreeing closely with the speed of fast game birds, but as the clay bird proceeds on its course the ve-

locity falls off, though curiously enough, during the first thirty-five feet of travel the pace is very nearly uniform, the clay bird averaging about sixty-four feet per second. The average velocity of a load of shot with standard ammunition is approximately one thousand feet a second, so that in one-tenth of a second a load of shot will traverse one hundred feet. In one-tenth of a second a game bird or clay target flying at the rate of sixty-four feet a second will traverse six and four-tenths feet and thus would be quite outside the circle of pellets at the time of their arrival. It is therefore evident that in shooting at crossing birds at a distance of from thirty to thirty-five yards, it is necessary to lead a bird about six feet to insure its coming within the circle of pellets.

The Second Barrel

The best way to increase your control over the second barrel is to use it at every opportunity. If you kill a bird dead in the air with your first shot, try and hit it again before it strikes the water or the ground. One of the principal secrets in developing facility with the second barrel is the practice of continuing the swing of the gun even after the trigger has been pulled, for the man who does this methodically finds that, after shooting the first barrel, his gun continues mechanically along its course and by the time he has steadied himself, it is practically in the right position to be fired again. The man who checks his gun immediately he has fired the first shot finds himself so far behind, when he is ready to fire again, that the only way he can get his gun up is with a jerk so rapid that he is unable to point accurately.—Bruette.

Allowance for Crossing Birds

The following table has been calculated on the basis of the table of velocities of shot and shows the space traversed by a bird moving at the rate of sixty feet a second in the brief interval that elapses from the fall of the hammer to the arrival of the shot at the various distances mentioned. It is, of course, understood that with slower birds approximately smaller distances must be adopted, and when faster birds are encountered the figures must

be correspondingly adjusted. These allowances are only absolutely correct for crossing birds.

For a bird distant 20 yards, lead 3 ft. 6 in.

For a bird distant 25 yards, lead 4 ft. 9 in.

For a bird distant 30 yards, lead 5 ft. 11 in.

For a bird distant 35 yards, lead 7 ft. 2 in.

For a bird distant 40 yards, lead 8 ft. 6 in.

In the case of going-away birds, the time occupied by the shot in reaching thirty-five yards is such as to allow the bird to have moved further seven or eight inches and the shot must cover this extra distance before overtaking the bird. This does not, however, exercise much influence on the aim taken by the shooter, because a bird going away is more or less in the nature of a stationary object as viewed by the shooter. Where the angle of flight of a going-away bird is inclined to the right or the left it represents something between a true going-away bird and a crossing bird and the actual displacement of the true line of aim, due to the causes mentioned, necessarily must be small. The shooter may thus accept the above table of allowances as satisfying all requirements.

HOW TO MAKE VARIOUS SHOTS

Rising Shots

Don't try to shoot on the drop. Train yourself to bring the muzzle of your gun up to your bird. Dropping on your bird will never make you a good bird shot; most birds are rising and you want to catch their line of flight so as to swing your gun ahead of them and lay down a barrage of shot into which they will fly. If you try dropping onto them it simply means that your gun is falling while the bird is rising and the chances are twenty to one against you picking out a point where the bird and the shot will connect.

Ground Shots

The shots usually presented in ground shooting are either a straight away or a crossing rabbit dodging through the brush where you get only a brief glimpse of his passing form. If the rabbit is jumped from the brush pile or close under feet it will usually take a straight away course. Do not shoot too quickly, let him get straightened out and also give the pattern of your gun time to open, and then aim four or five inches above his ears. In the case of a crossing shot, swing your gun a few inches in front of him and press the trigger. Do not be in too great a hurry, even in thick cover there are usually openings where you can catch sight of him long enough to shoot.

Straightaway Shots

When a grouse starts, nine times out of ten he will start from the ground. If he is going straightaway from you, throw up your gun so as to shoot a little over where you see him, and by the time your gun gets up and discharged, he will have flown right into the shower of shot.

Crossing Shots

If a bird starts toward the right or left, throw up your gun so as to shoot a little high and in advance of him, say from 1 to 3 feet; you must use your judgment about this, and be governed by the speed of the bird and the surroundings, etc. Follow the bird with your eyes, and your hands will unconsciously follow your eyes with the gun. A "right-handed" hunter has to make more allowance for speed when a bird is flying to the right, generally, and *vice versa.*

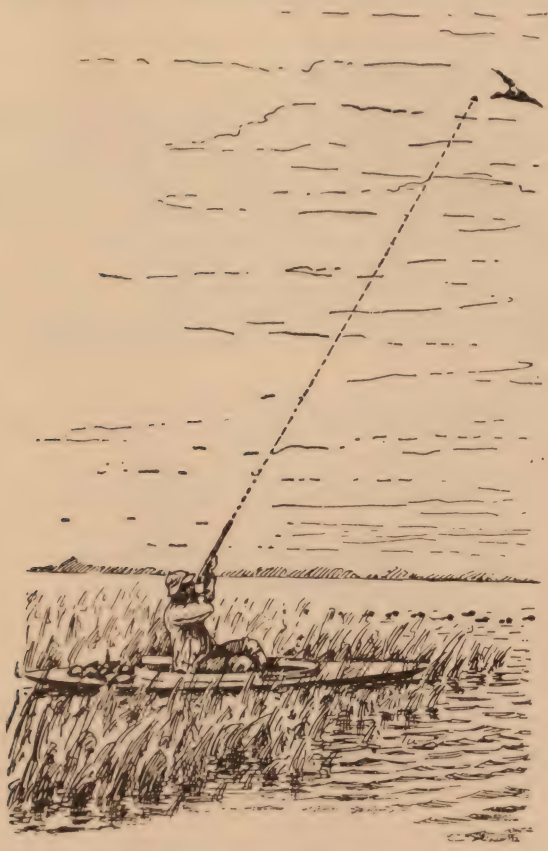
Old shooters declare that a crossing bird is never missed by being lead too much. In the case of a fast flying bird it is almost impossible to shoot too far ahead. A charge of shot does not move in a solid mass but strings out for several yards and success depends upon placing it ahead of the flying bird. This particularly applies to duck shoot-

ing, therefore bring your gun up along the bird's line of flight and as you pass it swing well ahead and press the

trigger without checking the movement of the gun in the slightest degree.

Incomers

This is a shot that gives many experienced gunners a great deal of trouble. Once learned, however, and it becomes one of the easiest of shots. The accompanying



drawing shows how it is done. The gun is brought up with a steady swing beneath the flying bird and the swing is continued until the bird is shut out from view by the

barrels. The moment this occurs press the trigger without checking the swing of the gun. You will center the bird. It all depends upon pressing the trigger while the bird is out of sight. The misses come in from a reluctance to do so. If as the bird disappeared from view you slow up your swing until the bird is in view again you are sure to miss.

Birds Coming Head On

If a bird is flying toward you get onto him as quickly as possible and press the trigger, for there is danger of its getting in so close that your charge of shot will not have time to open up, and you will either score a complete miss or tear your bird to pieces. If a bird gets very close in sometimes it is best to allow it to pass by and turn and take a shot at it going away. On the whole, however, it is better to accept these shots coming on. It is in ducking that they are most likely to occur. If you are in a small boat there is always danger of turning too quickly.

Doubles

There is no particular rule for making a double. Different conditions call for different procedures. There is

TRYING FOR A DOUBLE.

one thing, however, to bear in mind. If two birds are coming in to you and one is closer than the other, first shoot the one that is farthest out so that the one close in

will not have so much time to get out of range. If the one closest in is killed first those farther out will have a better chance of climbing out of the reach of your gun. The double calls for a good deal of skill and shooting judgment.

Flock Shooting

In shooting at a number of birds flying together, always select one bird for the aim, as near the head of the flight as possible, unless shooting in company, when each hunter aims at the position of the flock nearest his station.

Never shoot into a flock. This is the first principle of all experienced gunners. Do so and nine times out of ten you will miss. If you get a bird it will be by a scratch. Always pick out a particular bird to shoot at, and having decided on your bird do not allow your mind or your eye to wander from it. If you are shooting alone select a bird as near the head of the flock as possible. If shooting in company, each hunter selects a bird whose position in the flock is nearest to his station.

JUMPING MALLARDS.

Birds Rising to Flight

Birds rise to flight against the wind. Shoot when the bird is just on the turn or is steadying itself in the air after rising.

Bird About to Alight

A bird about to alight on the ground is falling, and at such time your aim should be under.

Variation in Flight

Not all game birds fly at the same speed, nor in the same manner. Consequently, it is impossible to set down any hard and fast rules governing the amount of lead to be given a bird under all conditions.

Ruffed grouse ordinarily rise suddenly into the air, following a short run. They rarely ascend more than thirty feet from the ground, and in reaching this height they travel from ten to twenty yards. As most upland game is killed under forty yards, the gun must be held high in order that the shooter may score. Grouse flushed in comparatively open cover, passing the shooter at right angles, are generally flying at a maximum speed and seldom deviate from a line parallel with the ground. On such shots, the gun must be held well forward, and a steady swing persisted in until after the cartridge has exploded

In heavy cover such as a cedar swamp, grouse will often flush from the top limbs of a tree. They invariably fly downward with great speed. This is probably the most difficult shot encountered in the whole range of field shooting. In attempting a shot of this kind, it must be remembered that what takes place is the reverse of a rising shot, except that the bird's flight describes more of an arc and he gets straightened out more quickly on a level course. The gun must be held well under, and the shot executed quickly.

The ruffed grouse is probably the trickiest of upland birds and no two shots are ever exactly alike.

Quail (Bob White) are more even in their tactics. They rise suddenly from the ground as does the grouse and fly evenly with little dodging. Here, too, the gun must be held well above, and forward on crossing shots. After the bird has straightened out, however, and is above the eye level, the gun must be held well under and ahead.

Woodcock usually bounce from the ground just ahead of the dog's nose and rise suddenly to the height of the alders or birches of the cover; when above the thickest cover, they maintain a fairly straight line. It is essential to hold well over the bird and shoot quickly, for once he has reached the top of his flight, he disappears rapidly into the cover.

The flight of the Jack snipe (Wilson's snipe) is said to resemble a corkscrew by some writers. It is really a series of zig-zags or long laps similar to the course taken by a sail boat "tacking." This flight is maintained for a short distance, and then the bird straightens out. By constant observation and practice one gets to learn just when the turn will come, and he can bag his bird within a few yards of the flush. Some prefer to wait until the snipe has ceased his erratic course, but unless one is shooting a heavy gun, this often does not happen until the bird is out of range.

On stormy days in late autumn, snipe are apt to be "cranky." They rise just within range and shots must be taken quickly. The shooter then must rely on snap judgment, and he is a good man who can make a presentable showing.

Shot Gun Sight

The wing shot does not always know exactly how he performed certain successful shots. What he does, however, is to get a line of sight straight down the rib of his gun and estimates speed, distance and lead properly. If his line of sight is too high, that is if he simply sees the end of his gun barrel from a point high above the breech, he shoots too high. If he looks across the barrels of his gun and does not carry the line of sight down the entire length of the rib, he shoots to one side.

The failure to get the line of sight down to the breech of the gun is a frequent cause of missing. A practical device for overcoming this fault is Wilbur's Shotgun Peep Sight. It is a very simple device that clamps to the barrels at the breech and presents two compartments or windows through which the object to be shot at can be instantly seen. With this ingenious device a shooter is practically sure of all straight away birds and the most puzzling of all shotgun problems—how to lead a quartering bird—can be instantly solved.

If an object is seen through either one of the openings on either side of the central post, it is in the killing pattern until it leaves this opening, so that a left quartering

bird seen in the right-hand opening is properly led and *vice versa.*

A straightaway bird, the instant it is in line with the center-post, is properly sighted. With this sight in proper use, one must be down on the gun, and the gun must be in the proper position, and this is something that, until now, no shooter has been able to determine.

Shooting Over a Pointing Dog

After your dog has pointed, if you are disposed to be nervous, remain perfectly quiet for a full minute. This will serve to steady you, and will teach the dog habits of stanchness. In the meantime, cast your eyes around, to see in what direction the birds are likely to fly when

flushed. If there is a cover of any sort, woods or swamps, within a radius of three hundred yards, you may be sure the birds will make for it. If there be a depression or hollow, or fence overgrown with grasses or briers and weeds, the chances are that the birds will go there. After

you have taken this observation, settle, as well as you can, the direction in which the birds are likely to fly. This plan possesses two advantages; the birds, in passing, should they persist in going to the covers, will give the sportsman the fairest possible shot, with the chances of his striking a vital part considerably increased over a dead-away one. A covey has been kept by these tactics from dense cover, into which it would have been folly to have followed them. Walk your birds up slowly and deliberately; do not rush on them, as though you were frightening an obstreperous pig; and do not shoot the moment they get out of cover; you will miss entirely, or tear your bird up so that it will be useless. Wait till the bird has passed you if they persist to cover, or, in other words, in passing cross shots; or if they be going straightaway, until fully twenty paces off.

Marking Down Birds

If the sportsman is not provided with a marker, he ought to try to mark his birds down as well as he can; this is not so easily done when he uses both barrels at the rise; he can, however, locate the bird very nearly, or, if his dog be an adept at the business, he will assist very materially. Practice in marking can alone make perfect. The best plan is to keep the eye well ahead of the birds; when they are ready to alight they will perform the arc of a circle, fold their wings, and come to grass.

Approaching Marked Down Birds

When approaching the ground where the birds have likely dropped, send the dog forward, steadying him by frequent commands, and making him work always directly in front, swinging backward and forward after the manner of a pendulum. If the sportsman finds the birds run after alighting, and the dog is disposed to road them up by ground scent, check him sharply, bringing him to heel; make a detour, so as to get beyond the birds, then work toward them from the direction in which they are running, otherwise the strong scent, arising from ground and coming down wind, will confuse your dog, and he is apt to make a long point, if cautious, or to flush his birds outright, if disposed to press his points. If, however, the

birds have not moved, keep the dog well in hand, hunting thoroughly every part of the ground, over and over again if necessary. Frequently they lie so close they will suffer themselves to be trodden on before taking wing. When at last the dog makes point, approach him cautiously; the probabilities are very strong that you will spring one or more birds in going to him, and, remember one thing—never budge an inch without being ready for instant work. After he has walked up the pointed bird, the sportsman's ears may any moment be assailed with the sharp whirr of hurrying wings. Do not leave the ground until you have sprung something like the number of birds you may think dropped there.

Quail Hunting

Don't start out too early in the morning; the birds are then seeking their feeding grounds—are running, and will never stand well to be pointed. Wait until the sun has dried off most of the dew, and you can hunt with decidedly more comfort to yourself, as well as to your dog. The birds will have finished feeding in a great measure in the meantime, and will be quietly resting in some grassy covert in their feeding grounds, or immediately contiguous thereto. Their flight will not be so long, and their movements more sluggish after taking flight, which, however, they will do very reluctantly.

Treeing Grouse

When flushed on level ground a ruffed grouse (partridge), if flying low, will alight on the ground. If he gradually rises and suddenly darts upward, look for him on the nearest evergreen to where you saw him last. If he at once rises to the top of a tree and then shoots off like an arrow, he will fly away to a distance. If he flies up a steep hillside he will alight on the ground, but if from a hill to a level below, he will be in some tall hemlock or spruce, standing straight and immovable on a limb near the body of the tree. If he flies from one hill across a ravine to another hill he will alight on the ground. The shorter flight the bird takes before alighting, the more ready he is again to take to flight. If he trees im-

mediately after being flushed, he will take the most prominent limb in view, and, unless your dog holds his attention, will be away when he perceives you; but should he fly some distance and be followed by your spaniel at full cry, he will alight on the limb of a hemlock or spruce near the body of the tree, hug his feathers close and stand as motionless as a knot. A side shot is surer than one in front or back. Get a tree between you and him if possible, or walk toward him as if you didn't know he was anywhere about. Shoot the instant you stop walking or you lose your bird.

Weather in Bay Bird Shooting

The most favorable wind for bay snipe shooting in the summer and autumn is one that blows steadily from the southwest. The birds that are coming from the north, and flying against it, lower their flight and skirt the bars and meadows, and see the stools more plainly and decoy much better than when traveling with the wind in the clouds. A wet summer is also found to produce the best shooting, as the meadows afford plenty of feed, and should the birds arrive early in the season, they stop and make the large marshes their home, flying north in the morning and returning south toward evening. This flight baymen call "a trade."

Killing a Wounded Bird

Many gunners bite its neck with the teeth. This will not break the skin. Others squeeze the bird on both sides close under the wings and at the same time press the forefinger over the wishbone. This stops heart and lung action and causes almost instant death, but it is impracticable to kill large birds in this way.

Preserving Dead Birds

Draw and stuff with green grass; cover bottom of box with a layer of coffee grounds, then pack a layer of birds; then another layer of grounds, then birds, and so on until all are packed. The grounds should be perfectly dry.

Preserving Killed Game

Take a supply of paper sacks (such as grocers use), just large enough to put a chicken into and tie snugly. Draw the birds and hang by the head until they have thoroughly dripped and the natural heat has left them. Stuff fresh leaves or grass inside; put into sacks head first, and tie sack tight enough to exclude the air. Put them in a cool, shady place until ready to ship. Birds packed in this way have kept over fifty hours, and when used were sweet and fresh, and this during the hottest weather of August. Never put game on ice unless you can keep it there until ready to use, for it spoils in an incredibly short time after being taken off.

Weight of Quail and Woodcock

The average weight of quail is about 6¼ ounces; of woodcock a trifle less. Quail run from 4 to 7½ ounces; woodcock seldom weigh less than 5, and sometimes 8¼ ounces, but their mean weight is a little less than that of quail.

Transportation of Migratory Game Birds

Waterfowl (except wood duck, eider ducks, and swans), rails, coot, gallinules, black-bellied and golden plovers, greater and lesser yellowlegs, woodcock, Wilson snipe or jacksnipe, and mourning doves and parts thereof legally taken may be transported in or out of the State where taken during the respective open seasons in that State, and may be imported from Canada during the open season in the Province where taken, in any manner, but not more than the number thereof that may be taken in two days by one person under these regulations shall be transported by one person in one calendar week out of the State where taken; any such migratory game birds or parts thereof in transit during the open season may continue in transit such additional time immediately succeeding such open season, not to exceed five days, necessary to deliver the same to their destination, and may be possessed in any State, Territory, or District during the period constituting the open season where killed, and for an additional period of ten days next succeeding said open season;

and any package in which migratory game birds or parts thereof are transported shall have the name and address of the shipper and of the consignee and an accurate statement of the numbers and kinds of birds contained therein clearly and conspicuously marked on the outside thereof; but no such birds shall be transported from any State, Territory, or District to or through another State, Territory, or District, or to or through a Province of the Dominion of Canada contrary to the laws of the State, Territory, or District, or Province of the Dominion of Canada in which they were taken or from which they are transported; nor shall any such birds be transported into any State, Territory, or District from another State, Territory, or District, or from any State, Territory, or District into any Province of the Dominion of Canada at a time when such State, Territory, or District, or Province of the Dominion of Canada prohibits the possession or transportation thereof.

Fowlers' Terms

Fowlers speak of a sege of herons or bitterns; a herd of swans, cranes or curlews; a depping of sheldrakes; a spring of teals; a covert of coots; a gaggle of geese; a badelynge of ducks; a sord or sute of mallards; a muster of peacocks; a bevy of quails; a congregation of plovers; a walk of snipes; a fall of woodcocks; a brood of hens; a building of rooks; a rummuration of starlings; an exaltation of larks; a flight of swallows; a host of sparrows; a watch of nightingales; a charm of goldfinches.

Live Decoy Ducks

Mallard, black and most fresh-water ducks will stool to live decoys, which should be of a similar class caught alive or raised in captivity. Fasten to one leg of each decoy a close-fitting leather boot, just above the foot, and attach a weight to that boot by a stout cord as an anchor. Set out the same as wooden stools, or use with wooden stools, taking care to anchor them far enough apart so that their anchor lines will not become entangled. Feed them on corn, and carry them in a crate or basket until they are accustomed to their work.

Diving Decoys

Run a long cord from neck of decoy through a block on the anchor weight and thence to blind or bough-house. By pulling this cord at intervals when the decoy is anchored out it will make the diving motion noticed in ducks when feeding.

"Toling" Ducks

Ducks are frequently led up to a blind in the marsh by the hunter waving a red blanket, scarf or other cloth in an erratic manner. Sometimes a red spaniel will, by running back and forth on shore, attract the curiosity of a flock of ducks resting on the water and lure them to death. The fox is said to practice this art to obtain a dinner of wild poultry. "Toling,' as this is called, won't work where ducks are much hunted and wild. Black ducks, gray ducks, redheads, bluebills and sheldrakes are said to be the only ducks that will "tole."

Sinkboat

To sink a boat for duck shooting take old salt sacks, put in enough sand to sink boat to required depth; when through shooting empty the bags of sand.

Blinds for Bay Bird Shooting

A box sunk in the sand is the most killing device. The box should be long enough to allow the gunner to lie in it comfortably, and its width should be several inches in excess of the breadth of his shoulders. From 10 to 15 inches will be of sufficient depth. It should be made of ¾-inch stuff, calked and pitched on the outside and in, thus making it thoroughly water-tight. At one end, near the top, an iron staple should be clinched, to which a ½-inch rope about 7 feet in length should be fastened. This will be found useful in towing the box behind a skiff, or for dragging it over the sand. Other blinds are easily constructed out of cedar boughs, cut about four feet in length, stuck in the sand or mud. They can also be made, when the wind is not blowing too hard, out of long reeds cut on the marsh. Painted canvas screens, hinged so as to fold up, have been used, and one of Long Island's

famous gunners once used an umbrella painted green. The fact is, it depends very much upon the place, and, moreover, on the conditions of wind and weather where to stool. While a vast number of birds in their autumnal flight follow the irregularities of the coast, there are countless numbers who make their migration far to sea, or take short cuts over the mainland. Those passing to sea only touch at the projecting points, and are consequently tame, while those who have run the gauntlet of an even shore or beach are wild, and less likely to stool. All these things must be taken into account, and the wilder the birds the better you must be hid. Sometimes, it is impossible or inconvenient to construct a box such as described, or find suitable stuff to build a blind; then a rubber blanket can be spread on the marsh, and a few sedge bushes or heaps of seaweed placed around you.

Bay Bird Stools

There are various kinds of stools manufactured, such as both solid and sectional wooden ones, hollowed out; flat tin stools, cut out of sheet-tin, and several years ago a patented tin stool was introduced on the market, that met with favor in the eyes of those sportsmen who cared little for expense. The latter are of very ingenious make, each half of the decoy being concave on the inside and convex on the out, thus representing one-half of a bird; the two parts are hinged together on the back, so that when they shut they resemble a well-formed snipe, and when open can be packed one in another, after the manner of a nest of boxes, and occupy but little space. All these decoys are painted to resemble the different varieties of snipe, and are stuck up by means of sticks. Each set of stools should have sticks, or "legs," of two lengths—short ones when used on dry bars or very shoal water, and long ones when the water is deep. It should be borne in mind that stools set in water are more readily seen, as their reflection and a watery background make them loom up and show to advantage. For wet stooling the wooden ones are preferable, as the tin ones soon rust and become worthless. The objection, however, to the wooden stools is their weight and bulk. For plover shooting on the upland

or dry ground, the tin ones are by far the best. It may here be said that shells, lumps of mud, etc., placed on sticks, often can be used when it is impossible to obtain the regular decoys.

Duck Shooting Loads

Ducks fly low, near the water, on a windy day. For the first flight of the fall (young ducks) use 3½ drams powder 1⅛ ounces No. 6 or 7 shot; but when the older birds arrive, 3½ drams powder and 1¼ ounces Nos. 4 to 6 shot is a good load.

Ducks' Power of Scent

It is always best to approach ducks and all wild-fowl on the water against the wind, as many old duck hunters claim that a wild duck's sense of smell is singularly well developed.

Edible Species of Duck

The mallard, teal, canvasback, redhead, widgeon, black duck, pintail, bluebill or broadbill, redneck, whistler, butterball or bufflehead. Some of these ducks, like the butterball, are edible in some waters and unfit to eat in others; the difference is owing to the kind of food they obtain.

Blinds for Duck Shooting

Blinds or bough houses should be built on the ducking grounds before the season commences, as ducks will avoid any new structure after they arrive. They may be made of logs,, brush, grass, cornstalks, etc., and should completely conceal the hunter.

Decoys

In both duck and bay bird shooting, the decoys are always to be set to the windward of the blind. Set out about fifty, if possible, as the greater the number the better the show to attract the flocks. The stools should be set in a crescent-shaped circle, with the heads of the decoys pointing to the wind. There are two reasons for arranging them in this way: First, all wild-fowl alight to the wind, as they need the resistance to the air; second,

flocks of birds that intend to stool drop down to leeward, where they circle and then draw in over the decoys. It is, therefore, not advisable, as a rule, to shoot at a flock passing over your head, as it will turn, and should it light, it will do so at the head of the line of stools. It will

The Mallard

thus be seen that as the birds check their flight to alight, they crowd and jostle together, affording the most killing results of a well-directed volley into their ranks.

Paint for Decoys

Decoys painted with lampblack and oil will have a more natural look than those painted with bright polish paints.

Duck Call

A duck call or squawker is made thus: Take a tube of wood or metal (bamboo is best) about ¾ inch in diameter inside, and 4 to 8 inches in length. Fit a plug 3 inches long to one end, split it in two, groove one-half to within ¼ inch of its smaller end, the groove being ¼ inch wide and same depth. Hammer a thin piece of steel, copper or brass 2½ inches long and ⅜ to ½ inch

wide, to increase its elasticity. This is the tongue, and one end, which should be thinner than the other, should have the corners rounded. The tongue is then placed over the grooved half, the round end nearly to the extreme smaller end of the plug, and the tongue completely covering the groove. The other half of the plug should be shortened about 1½ inches from its smaller end, and then being placed on the grooved half, thus holding the tongue fast, both should be pushed firmly into the tube. By blowing into the other end of the tube the call is produced; the tone, degree of firmness, etc., being regulated by moving the shortened end of the plug in or out as a finer and sharper, or lower and coarser note is required. Practice and experience are necessary to make it effective.

Snipe Whistle

A whistle to call snipe is made thus: Carefully dry the leg of a big yellow leg, push out the marrow with a red-hot knitting-needle, plug up one end, and then practice.

Turkey Call

Take a piece of dogwood or maple, say 6 inches long by 1½ inches diameter, and with a small-sized bit bore a hole through it lengthwise, then with a tapering or hollow bit ream it out to the size of 1¼ inches tapered to size of small bit. At the other end insert a piece made either of wood, horn or cane, according to fancy, for mouthpiece. The tone of the caller depends largely on the size of the mouthpiece, and great care should be bestowed on this part of the caller. When the turkey note is perfected to suit the individual, the shape and finish can be arranged. A caller adapted to one hunter cannot be used by another, unless he is an adept in the business. Some hunters yelp by placing the caller in the center of their mouth, while others yelp from the side. There are some notes which cannot be made from the side of the mouth. In hunting, different notes will have to be made according to the game in which you are in pursuit of. For instance, if a flock of turkeys were flushed, and it were necessary to kill the old hen, you would yelp like a young turkey; if a young one was desired, you would imitate the hen. And

in pursuit of the gobbler, you would not yelp like either of them, but you would bring to your aid patience, "turkey sense," and all the cunning possible to capture him.—*Lowndes.*

Turkey Calls

Make a little box of Spanish cedar 2½ inches long, ¾ to ⅞ deep and 1 inch wide. Cut a piece of smooth slate that will lie nicely in the bottom of the box; have the top smooth and even. Make the box without glue, put it together with brass pins. To operate this, hold the slate between the thumb and middle finger of the right hand while the call is held by the thumb and middle finger of the left. . . . The common bone call is made from the hollow wing bone of the bird. The ends are cut off, and the call note is made by violently sucking through the tube. . . . With a narrow chisel hollow out a piece of dry cedar, 2 inches long, and 1½ inches wide and ¼ inch thick, so that the sides are about as thick as a piece of tin; but do not let them be too delicate. It should be hollowed within ¼ inch of the bottom and ends. Taking this simple caller between your thumb and fingers, rub it crosswise against the but of your gun or on the barrels. No rosin is required; the simple wood can be manipulated with a little practice to perfectly imitate the turkey call.

For Ruffed Grouse

These are the most difficult of all birds to shoot upon the wing. They leave the ground with a rush and roar that is very trying to the nerves of unschooled sportsmen and are usually out of sight before the novice has comprehended what has happened. In many cases you can simply get a glimpse of their disappearing forms. Fire, and then swing the gun along the direction of the flight and fire the second barrel. You may hear a plump form come crashing to the ground, but if you do not, never mind, for misses do not count in ruffed grouse shooting. Follow your bird and try and flush again for after being flushed two or three times the ruffed grouse tries to escape by hiding and then your patient dog may have an opportunity to point and give you a more advantageous

shot. The gun for ruffed grouse shooting is a 16-gauge with open bored barrels 26 or 28 inches long weighing 6½ lbs. The load for a gun of this kind is 24 grains of Dense Powder or 3 drams of bulk with 1 oz. of No. 8 shot.

Prairie Chickens

Early in the season these birds flush at easy distances, but after they have been shot at a few times and as the season advances, they become wilder and more difficult to approach except on warm days, when they will sometimes take refuge in heavy grass, which they are loath to leave and have to be sent out ahead of a pointing dog. Under these conditions some birds go straight away only a few feet above the prairies, others will flush at 20 yards, go straight up in the air and then beat it for the horizon; while occasionally birds flushed by your dogs or companions, come sailing along and afford full quartering shots. The principal thing to remember is that they are large birds and are moving much faster than they appear to be. In the case of birds that flush fifteen or twenty yards away, you must be quick with your first barrel and always ready

to follow up with the second. The birds that spring straight into the air, catch, if possible, at the top of their flight and be ready with your second in case you miss. The best gun for chicken shooting is a 16-gauge weighing 6½ lbs. with barrels 28 inches long, the right barrel modified and the left barrel full choke. The best load for a gun of this kind is 24 grains of Dense Powder or 3 drams of bulk with 1 oz. of No. 6 or No. 7 shot.—"Gun-craft."

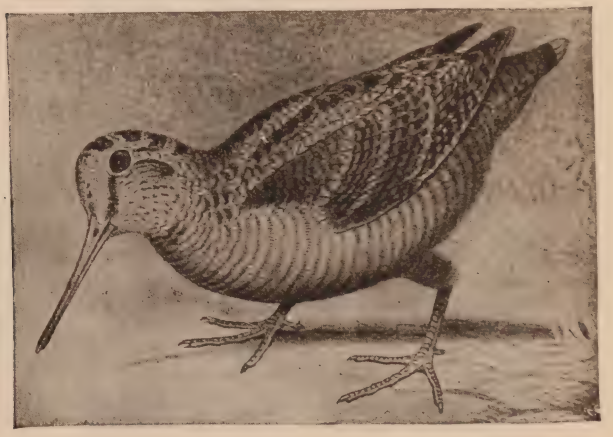
Jacksnipe

In cold, windy weather they are constantly on the move and difficult to kill, because they are small marks and keep well out of gun range. On warm, sunshiny days when

they have not been disturbed, they are easier to bag. Like many other game birds they rise against the wind, so that if you work with the wind on your back they will rise toward you and beat off to one side. They have a disconcerting criss-cross flight and level side-shots are easier to make. Much has been said about not shooting too quickly and allowing them to steady. If you wait until a jacksnipe steadies, he will be out of gun range. Shoot at the top of his flight when he first jumps into the air, if possible, but do not attempt to follow all of his twists and angles with the muzzle of your gun. Swing ahead of one of his long glides and snap him in the air at the moment he is attempting to change the angle of his flight. Lead your crossing shots liberally and keep your gun moving while the trigger is being pulled. The 5½ lb., 20-gauge, 26 or 28 inch barrels, the right modified and the left full choke is the ideal gun for snipe shooting and the best load is 2¼ drams bulk powder, or 18 grains of dense and not over ¾ of an ounce of No. 8 or No. 9 shot.—"Guncraft."

Woodcock

These birds are undoubtedly much keener and wiser than they are usually thought to be. Sometimes they hear the approach of the hunter and attempt to hide and will



admit of closer approach in hopes that the intruder will pass by. When forced to flight they simply clear the covers and after a short flight of a dozen yards, flop to earth. It requires the closest kind of shooting to stop them as only momentary glimpses can be caught through the cover. If the shot is taken when the birds are springing into the air the aim may be well above them, but if only a glimpse of the bird may be caught at the tops of the cover, the aim should be below where they were last seen as they will either then be dropping to the ground or continuing their flight along the horizon line. The gun and load recommended for snipe shooting is admirably adapted for work in the woodcock coverts.—"Guncraft."

SECTION II.

THE RIFLE

Selecting a Rifle

The first step toward the selection of a rifle is to determine the size or caliber of the gun best fitted to one's needs. This depends to a large extent upon the game to be hunted or the locality where the weapon is to be used. While the use of a rifle is not limited to any particular game, it is, as a rule, better suited to a certain class of shooting. Black bear and deer have been successfully hunted with rifles of the 25-20 and 32-20 calibers and small game like the woodchuck and fox are sometimes shot with rifles using high-velocity cartridges of the 30-30 caliber or larger. However, it is not a wise plan to go after large game with a small-game rifle, and it is an indication of poor sportsmanship to use a big-game rifle in shooting small game.

The use of a high-power rifle is out of the question in a well-settled community, especially if it is devoid of hills, on account of the long range of the gun and the danger from ricochetting bullets.

Striking Power

The energy or striking power of a bullet determines largely its killing power, although there is a difference in the effectiveness of small, elongated bullets driven at high velocities and large-caliber heavy bullets driven at low velocities, even though they both develop the same

energy at a given distance. The latter is best described as giving a thrust and the former as giving something of an explosive effect, as, with expanding bullets, they strike animal tissues. Therefore, it can be seen that in shooting big game, a bullet driven at a low velocity may not give sufficient shocking power, and a bullet driven at too high a speed would destroy itself before it penetrated sufficiently to reach a vital spot.

The range and trajectory of a projectile is dependent upon its weight and velocity. A short bullet does not retain its velocity or its energy as well as a long bullet, and for this reason some of the large-caliber, light weight bullets are suitable only for short-range shooting.

Barrel Lengths

The length of the barrel is an important factor to consider in selecting a rifle. The shorter the barrel the more difficult it is to hit an object at a distance on account of the decreasing of the sight base; the distance between the front and rear sights increases the possibility of an error at the target a proportionate amount. While an inch or two in the length of the barrel will not make any noticeable difference in the shooting qualities of the gun, a greater or less length will make a difference that is easily recognized in shooting at the longer ranges.

In the early days of the black-powder rifles, when the powder charges were slow in reaching their maximum propulsion force, the gun barrels were very long, even up to 36 and 40 inches or more. To-day one seldom sees a rifle barrel of more than thirty inches in length. Rifle barrels of 26 or 28 inches are the most satisfactory for all-around use. The writer always prefers a 28-inch barrel, if it is obtainable, for high power rifles of the 30 calibers and 26 inch for the 25 calibers. Short barrels sometimes result in a poorly balanced gun. If a rifle using the 30 Government cartridge will give a 150 grain bullet a velocity of 2700 feet per second in a 24-inch barrel, it would have given the same bullet a velocity of around 2750 per second in a 26-inch barrel or a velocity of only about 2650 feet per second had the barrel been only 22 inches in length.

From these figures it can be seen that there would be

quite a difference in the shooting qualities of an 18-inch and a 28-inch barrel from the ballistic standpoint, outside of the great advantage that the 28-inch barrel would have

over the 18-inch when it came to an accuracy test in shooting the gun offhand at the range or in the field.

Round Barrels

A rifle with a round barrel has many points in its favor over one with an octagon barrel. The octagon barrel is

not so popular as it was years ago, and there should be little demand for an eight-sided gun barrel. Rifles of to-day depend more upon their streamline appearance, good balance and ease in handling than upon a bold outline form that was so noticeable in firearms of years ago. Octagon barrels are heavier than round barrels, and they do not add any appreciable strength to the barrel itself. Besides being more difficult to manufacture, and costing more, they do not possess any advantages over the plain and neater-looking round barrel. One of the common objections to the octagon barrel is that after the gun has been subjected to use, the finish wears off along the angular corners, giving a reflecting surface and appearance of much use.

Rifle Actions

Repeating rifles are generally preferred for hunting purposes, as they give a reserve of extra shots in the case of misses or wounded game and save valuable time that otherwise would be lost in extracting the empty shell and loading the gun with a fresh cartridge from the belt or pocket. Repeating rifles are just as accurate in shooting as single-shot rifles, and should the shooter choose, he can generally use his rifle as a single-shot by feeding it with a loaded cartridge each time the action is opened and thus save the full magazine for use in event of urgent need.

There are four classes of repeating rifles in general use to-day: automatic, lever action, trombone action and bolt action. The lever action is the most popular, as it combines speed with multiplied extracting power and permits successive shots with little disturbance in aiming. In operating the lever action rifle, the power applied to the finger lever is multiplied about ten times in the power available at the extractor.

The automatic rifle easily stands first when it comes to rapid firing, as the gun, being manipulated by the recoil of the fired shell, it is only necessary to release the trigger after each shot and pull it again to continue shooting as long as a loaded cartridge remains in the weapon. Trombone-action rifles, where the ejecting and loading are done by a backward and forward movement of a sliding fore-

arm, are popular with many hunters. Bolt-action rifles have never been very popular in America. Bolt actions are well adapted to cartridges having heavy charges of smokeless powder; however, unless this form of action is so constructed as to prevent the firing of the gun until the bolt is moved forward into its place and locked by the bolt handle, it becomes the most dangerous of the various rifle actions.

There have been many hunters injured by premature discharge of cartridges in inferior foreign-made bolt-action guns, where the breech bolt was driven out at the rear of the weapon by the force of the explosion. Besides being the slowest to operate of the different repeating mechanisms, the bolt action has the disadvantage of giving no leverage to assist in extracting a jammed shell. American manufacturers are putting out several good bolt-action rifles, and the acquaintance gained with our most excellent Springfield army rifle in the late war has made the bolt action more popular in this country than before.

Game Rifles

For the largest of the big game, such as the huge bears of Alaska, the giant moose of eastern Canada, or the fierce beasts of the tropical jungle, a heavy bullet of good length and driven at a muzzle velocity of well over 2,000 feet per second should be considered. The main points for such a weapon would be to deliver a smashing knock-down blow and give good penetration with soft-point bullets.

Among the cartridges suited for this class of shooting are: the 30 Government, using the heavier-weight bullets, and the 35 and 405 Winchester. The first-named cartridge is better for long-range shooting than the latter two. For big game, such as deer, bear, puma, mountain sheep, elk, wild goats, a rifle giving a bullet a velocity of around 2,000 feet per second or more and a striking energy of over 1,500 foot pounds would be satisfactory.

Among the cartridges adapted to this class of shooting are the 250-3000 and 303 Savage; 30-30, 32-40 and 38-55 high-velocity loads; 32 Special, 33 Winchester, 35 Remington, 30 Army and 401 Winchester. For medium-sized

game, such as wolves, coyotes, wildcats and other predatory animals, and for an occasional shot at deer or other larger game, the 22 high-power Savage, 25-35, 25 high-power Remington, 38-40, 44-40, 32-40 and 38-55 would give sufficient power at all ordinary ranges.

For small game, such as foxes, woodchucks, jackrabbits, raccoon, geese and the larger game birds, rifles of the 25-20 and 32-20 class and reduced smokeless powder loads in high-power rifles would be found the most satisfactory. For rodents, crows, small-game birds and the smallest of game animals, the 22 long rifle and the 22 Special rim-fire cartridges (22-7-45) would give all the necessary range and killing power.

The Twenty-Two

In selecting a 22-caliber rifle it is best to get one that will handle the 22 long rifle cartridge, which is the most accurate of the 22 rim-fire cartridges. This load gives a muzzle velocity of around 1,100 feet per second and develops a muzzle energy of over a hundred foot pounds, as against about 55 foot pounds for the 22 short and a little over 85 for the 22 long cartridge. The 22 Special cartridges are a trifle more powerful than the 22 long rifle, but as they are inside lubricated, they are much more expensive to use. If the shooter wishes to get the best results from a 22 rifle, cartridges loaded with black, semi-smokeless or lesmok powders should be used, as they are more powerful and more uniform in their shooting qualities than those loaded with smokeless powder. The development of smokeless powders has not yet reached a point where they are as satisfactory as the black or semi-smokeless powders for use in small rim-fire cartridges like the 22's. Twenty-two-caliber rifles can be obtained in a greater variety of styles and makes than any other caliber, and along with the plentiful supply comes a conglomeration of cheap makes that the prospective buyer would do well in avoiding.

Types of Rifles

The passing of the old big-bore, black-powder rifles have left in their wake three distinct classes of guns: smokeless-powder rifles, black-powder rifles and those adapted to either high-velocity smokeless or black-powder loads. This classification should be taken into consideration before attempting to choose a rifle. High-power rifles, like the 250-3,000, 30-30 and 30 Government, are intended for smokeless powders only, and black or semi-smokeless powders cannot be used in them with any degree of success. These rifles have very rapid twists, a majority of them giving a bullet a complete turn in every ten inches as it passes through the barrel. Rifles having smokeless steel barrels and a comparatively slow twist of rifling, such as the 32 Special and some of the 32-40 and 38-55 calibers, are equally adapted to black, semi-smokeless, low-power smokeless or high-velocity cartridges.

The twist of rifling in the guns of this class ranges from one turn in sixteen to one turn in twenty inches.

All rifles not having smokeless steel barrels belong to the black-powder class, and in such guns a high-velocity load cannot be used with safety. However, low-power smokeless-powder cartridges that give a slightly increased velocity over black-powder loads can be used in them with good results. The black-powder rifles of to-day are the survivors of a once great class of black-powder rifles ranging from big, bulky cartridges, like the 38-90-217, 40-110-260, 45-125-500, 50-100-450, etc., down to the small 22-caliber cartridges. The twist of rifling in a majority of these guns was comparatively gentle, some only having one turn in sixty inches.

Sights

Rifles as sent out from the factories do not always have sights that are best adapted to the individual requirements of the shooter or the field in which the weapon is to be used. It is not always possible to lay down a specific rule to follow in choosing sights, as no two shooters would always meet with the same success with any particular class of sights owing to a difference in their visionary powers. Coarse sights are better adapted to accurate shooting than the finer sights, besides they permit more rapid firing—a reverse of what would appear to be true.

From a scientific standpoint, the peep sight is the best rear sight, as the principle employed is to allow the eye to center itself within the stem aperture and devote its attention entirely to the front sight and the object aimed at. Peep sights are generally fastened to the tang of the rifle or to the receiver, and when they are used the rear sight on the barrel should be removed and a blank piece, made for the purpose, inserted in its place, or a folding rear sight that will lie close to the barrel may be used so not to interrupt the range of vision. Peep sights with large aperture are better suited to accurate shooting than those with small apertures. Any of the bead front sights of metal that have a shiny surface are of little value for hunting purposes, as they are not only trying on the eyes, but the optical disturbance caused by the

reflected light will result in very irregular shooting on bright days.

Hunting in the woods, where a greenish hue or reflection predominates, it is important to have a sight that will show up well in contrast with the predominating color, and for this reason a black metal sight should be seldom used in a timbered country. An ivory bead front sight makes a very good one for shooting on a bright day or in the woods, as ivory has a decided advantage over other materials used in making sights, as it does not reflect the sunlight. In selecting a bead front sight the surface of the bead facing the shooter should be perfectly flat and taper gradually towards the muzzle of the gun, thereby presenting a well-formed globe that will show up distinctly and reduce to a minimum the possibility of reflections or shadows as the light strikes the rear face of the bead at different angles.

Co-ordination

To be able to shoot well, you must correctly co-ordinate the holding, aiming, trigger-pull and calling the shot. When the butt-plate settles to the shoulder you must put every bit of your will power into holding steadily, aiming correctly and carefully squeezing the trigger at the instant that the aim is correct. You must not flinch the thousandth part of an inch, nor blink so that you cannot call the shot. The most difficult part of the whole act is getting the finger to pull the trigger correctly at the instant everything else is right. If you put the required attention on holding and aiming, when it comes to pulling, your forefinger will act as though it were frozen. It takes a lot of practice to learn to pull at the right instant. It is easy to get this practice. Make a small miniature target of thin paper. A target 1½ inches square with a quarter-inch black bull's eye is about right. Paste it on the window pane in the room where you keep your rifle, and every day take up the rifle and snap a few shots at the target, using all the care you would if you were shooting at an important match. Placing the target on the window illuminates it finely. If you learn the five essentials first, and then assiduously practice at this, you will soon notice wonderful improvement in your shooting.

Alignment of Sights

This chart clearly illustrates how the front and back sights should be used in reference to the target and what will happen when a variation is made from the correct alignment shown in Fig. 1.

Full open sight. Fig. 1.

Correct Center bull.

The illustrations on this page show how front and back sights should "line up" with the target.

Fine sight. Fig. 2.

Low shot. 6 o'clock 2

Fig. 1 shows how a correct aim looks through an open sight. Always aim just below the center of the target. This gives you a clear view ahead. You will have a better chance of seeing how the bullet strikes. You will also avoid the common fault of shooting too high.

Too full. Fig. 3.

High shot. 12 o'clock 2.

Not centered. Fig. 4.

Left shot. 9 o'clock 2.

Fig. 2 shows how the sight looks when the front sight appears too low through the notch of the back sight.

Not centered. Too full. Fig. 5.

High right shot. 2 o'clock 2.

Fig 3. shows the result of holding the front sight too high.

Figs. 4 and 5 show the results of not having the front sight centered in the rear sight, the shots going to the left in Fig. 4 and to the right and high in Fig. 5.

Sight inclined. Fig. 6.

Low left shot. 7 o'clock 2.

Sight inclined. Fig. 7.

Low right shot. 5 o'clock 2.

Figs. 6 and 7 illustrate a common fault with beginners, that of "canting" the rifle, or tipping it so that the shoulders of the back sight are not on a level, or horizontal line.

Correct and incorrect methods of sighting.

Trigger Squeeze

All your best efforts at holding and aiming are without avail, if at the instant before the rifle is discharged, you spasmodically jerk at the trigger and thus destroy the aim. It is astonishing how a little jerk in releasing the trigger will cause the sights to jump off the mark the fraction of a second before the rifle is discharged. To pull or squeeze the trigger without disturbing the aim is easily learned with a little painstaking practice. Learn first by the feel, just about how much pressure you must put on the trigger with your forefinger to cause the gun to go off. Then practice all but a couple of ounces of this pull on the trigger as you place the rifle to your shoulder. Hold the rifle with trigger compressed thus while you are aiming, and when your aim is right, carefully squeeze on the couple of extra ounces, which will cause the discharge. If you have a tendency to flinch or jerk, cure it by plenty of practice, putting absolutely every atom of will power that you have into the act of trigger squeeze, as described. You must put enough will power and attention into it to make you forget entirely all about the report and recoil. Practice with a small .22 caliber rifle also helps to correct this bad habit. Every time you catch yourself jerking the trigger, spend ten minutes in slow methodical trigger-pull practice with an empty rifle. A bolt-action rifle may be snapped all you wish without hurting it in the least. With a hammer rifle insert a piece of rubber eraser just behind the firing pin for the hammer to strike on. Never snap a .22 caliber rim-fire rifle.

Trigger Pull

The pull should never be over 4 pounds, and 2½ pounds is about ideal for an all-around hunting arm. The pull is weighed by applying a spring balance scale to the middle of the trigger and applying the pressure in line with the barrel. Almost all lever-action rifles have pulls around 7 pounds when they come from the maker, and also almost all are capable of having the pull reduced to 4 pounds or under with safety when done by a skilled workman. Some automatics using heavy cartridges cannot have the pulls reduced much below 7 pounds with safety, but as all rifles coming under this category use short, blunt bullets at

high velocity, they are so inaccurate at long ranges that the heavy pull is of no consequence. A good pull should be sharp and clean. There should be no movement whatever to the trigger until it suddenly releases the hammer of firing pin and the bullet is off. Some actions, however, are so designed that it is almost impossible to eliminate the drag and creep. Beware of these, for one can never do really fine shooting with such a trigger pull. When you become a good shot you will realize that fine shooting depends more on the control of the trigger than any one thing.

The pull of bolt action rifles is peculiar. When pressure is first applied to the trigger it moves back about one-eighth inch under about a two-pound pressure. This is known as the safety pull, is necessary for the safety of the arm, and should never be removed. After this pull or movement has been taken up by the applied pressure the remainder of the pull is excellent. Such a pull is confusing at first to one accustomed to the ordinary pull, but it is soon learned and is not a disadvantage.

I have often seen beginners spend five to ten seconds in aiming before their fingers touched the trigger. They were simply wasting time. Learn to put all but the several last ounces of pressure on the trigger as you place the rifle to the shoulder, and then determine that you will squeeze off those last ounces lightly, easily, and without jerk—and do it!

Calling the Shot

Until one can do this he is only a beginner at the shooting game. Without acquiring the knack he can never tell whether his rifle is correctly sighted or not. Your rifle should shoot where it is aimed. If you aim four feet off the target and make a bull's-eye, you would hardly congratulate yourself either on your shot or on your weapon. Calling the shot simply consists of catching with the eye a picture, as it were, of the exact point on the target where the sights were aligned at the instant that the recoil of the shot blotted out the vision. This is, of course, the point where the shot should hit if the rifle is correctly sighted.

No one can hold absolutely steady. As you first start to

aim, the front sight wabbles all over the target. You steady down a little and it wabbles around the bull's-eye. You try to squeeze the trigger just as the sights wabble below the center of the bull. Did you succeed? If you are quick enough, the retina of your eye will retain the memory of just how the sights and target looked as the rifle recoiled up and the sight was lost to view. A little attention and practice will give you the knack. Most men can acquire it in a dozen shots.

The Accuracy of Hunting Rifles

Below are grouped certain of our more common rifles, showing the diameter of the circle into which they can be relied upon to shoot all or nearly all of their shots at 100 and 200 yards:

CLASS "A."—2 INCHES AT 100 YARDS, 4 INCHES AT 200 YARDS.

.280 Ross.
.30 cal. Model 1906.
.30-40 Krag and Winchester.
.30 cal. Model 1903.
.256 Mannlicher-Schoenauer.
.25-35 W.C.F. (in single shot).

CLASS "B"—2½ INCHES AT 100 YARDS, 6 INCHES AT 200 YARDS.

.7 mm. Mauser.
.8 mm. Mauser.
.32 Ideal.
.303 British and Savage.
.25-35 Rem. Auto.
.25-35 Marlin.
.25-30 W.C.F. Low pressure smokeless.
.25-20 Single Shot.
.25-21 Stevens.
.25-25 Stevens.
.28-30 Stevens.
.22 Long Rifle (in target rifle).

CLASS "C"—3 INCHES AT 100 YARDS, 8 INCHES AT 200 YARDS.

.30-30 W.C.F.
.35 Rem. Auto.
.35 W.C.F.
.405 W.C.F.
.45-70 Black and smokeless.
.32-40 Low-pressure smokeless.
.33 W.C.F.
.32 Winchester Self-Loading.
.32-20.
.25 Rim fire.
.38-55
.22-15 Stevens.

CLASS "D"—3½ INCHES AT 100 YARDS, 12 INCHES AT 200 YARDS.

.32 Win. Special.
.351 Win. Self-Loading.
.32 Rem. Auto.
.45-70 and .45-90 H. V. (1)
.25-20 H. V. and black powder.
.32-20 H. V. (1)
.38 W.C.F. (1)
.44 W.C.F. (1)
.401 Win. Self-Loading (2)

(1) Over 200 yards grouping is irregular.
(2) Over 150 yards grouping is irregular.

What Cartridge to Use

Use the standard factory loaded ammunition. This has been all figured out by experts. Don't improve on them, but let well enough alone and use "store ammunition."

Recoil in Rifles

Recoil is movement of the rifle to the rear at the instant it is fired. It is commonly called the "kick of the rifle." It varies with the powder charge, rate of burning of powder, weight of rifle, weight of bullet, initial velocity and the caliber of the rifle. Remember to try to hold on the target during the period of recoil. You won't be able to do it, but by trying you will eliminate flinching.

Windage Allowance—Springfield '06 Ammunition

In the following table are shown the points of windage necessary to correct for a 10-mile-an-hour wind:

Range	III or IX	II, IV, VIII, X	I, V, VII, XI
Yards	*Points*	*Points*	*Points*
100	0.23	0.2	0.1
200	.34	.31	.17
300	.61	.53	.30
400	.86	.75	.43
500	1.11	.96	.55
600	1.39	1.20	.69
700	1.68	1.45	.84
800	2.00	1.73	1.00
900	2.34	2.03	1.17
1,000	2.67	2.30	1.33

Winds blowing from XII and VI o'clock directions have no deviating influence on the flight of the bullet, but these winds have the effect of shortening (in the case of XII-o'clock wind) or lengthening the range (in the case of VI-o'clock wind). The correction necessary to apply in the case of such winds is inappreciable.

O'Clock

A term employed to indicate, by means of the divisions on the dial of the clock, the location of a hit on the target or the direction from which the wind may be blowing, as a 7 o'clock, 4 or 5 o'clock wind. In speaking of the position of a hit, the dial is supposed to occupy the front of the target facing the firer, with 12 at the top of the target.

In speaking of wind, the dial is supposed to lie on the ground, with the 12 toward the target and the center at the firing point.

Drift

The lateral deviation of the bullet caused by the resistance of the air and the rotation of the bullet on its longer axis.

Line of Aim

The imaginary right line joining the middle point of the horizontal line of the open sight, or the center of the peep sight, and the point of aim.

Ricochet Shots

Bullets which rebound after striking the ground or any other obstacle and continue their flight are said to ricochet.

Trajectory

The path described by a bullet in the air moving under the combined influences of the force of propulsion, the force of gravity, and the resistance of the air.

To Determine the Energy of a Bullet

Assuming we know the weight of the bullet and its velocity and desire to know the striking energy in foot pounds, the following short method is very efficient:

Square the velocity of the bullet in foot seconds. Divide this result by 7000 to reduce it from grains to pounds.

Divide this quotient by twice the acceleration of gravity, or 64.32. This will give the striking energy in foot pounds of each grain of bullet weight.

Multiply this result by the weight of the bullet in grains and you have the striking energy of the bullet in foot pounds.

Cleaning the High Power Rifle

a. The proper care of the bore requires conscientious, careful work, but it pays well in the attainment of reduced labor of cleaning, prolonged accuracy-life of the barrel,

and better results in target practice. Briefly stated, the care of the bore consists in removing the fouling, resulting from firing, to obtain a chemically clean surface, and in coating this surface with a film of oil to prevent rusting. The fouling which results from firing is of two kinds—one, the products of combustion of the powder; the other, cupro-nickel scraped off (under the abrading action of irregularities or grit in the bore). Powder fouling, because of its acid reaction, is highly corrosive; that is, it will induce rust and must be removed. Metal fouling of itself is inactive, but may cover powder fouling and prevent the action of cleaning agents until removed, and when accumulated in noticeable quantities it reduces the accuracy of the rifle.

b. Powder fouling may be readily removed by scrubbing with hot soda solution, but this solution has no effect on the metal fouling of cupro-nickel. It is necessary, therefore, to remove all metal fouling before assurance can be had that all powder fouling has been removed and that the bore may be safely oiled. Normally, after firing a barrel in good condition the metal fouling is so slight as to be hardly perceptible. It is merely a smear of infinitesimal thickness, easily removed by solvents of cupro-nickel. However, due to pitting, the presence of dust, other abrasives, or to accumulation, metal fouling may occur in clearly visible flakes or patches of much greater thickness, much more difficult to remove.

c. In cleaning the bore after firing it is well to proceed as follows: Swab out the bore with soda solution (subparagraph *j*) to remove powder fouling. A convenient method is to insert the muzzle of the rifle into the can containing the soda solution and, with the cleaning rod inserted from the breech, pump the barrel full a few times. Remove and dry with a couple of patches. Examine the bore to see that there are in evidence no patches of metal fouling which, if present, can be readily detected by the naked eye, then swab out with the swabbing solution—a dilute metal fouling solution (subparagraph *j*). The amount of swabbing required with the swabbing solution can be determined only by experience assisted by the color of the patches. Swabbing should be continued, however, as long as the wiping patch is discolored by a bluish-

green stain. Normally a couple of minutes' work is sufficient. Dry thoroughly and oil.

d. The proper method of oiling a barrel is as follows: Wipe the cleaning rod dry; select a clean patch and thoroughly saturate it with sperm oil or warmed cosmic, being sure that the cosmic has penetrated the patch; scrub the bore with the patch, finally drawing the patch smoothly from the muzzle to the breech, allowing the cleaning rod to turn with the rifling. The bore will be found now to be smooth and bright so that any subsequent rust and sweating can be easily detected by inspection.

e. If patches of metal fouling are seen upon visual inspection of the bore the standard metal fouling solution prepared as hereinafter prescribed must be used. After scrubbing out with the soda solution, plug the bore from the breech with a cork at the front end of the chamber or where the rifling begins. Slip a 2-inch section of rubber hose over the muzzle down to the sight and fill with the standard solution to at least one-half inch above the muzzle of the barrel. Let it stand for 30 minutes, pour out the standard solution, remove hose and breech plug, and swab out thoroughly with soda solution to neutralize and remove all trace of ammonia and powder fouling. Wipe the barrel clean, dry, and oil. With few exceptions, one application is sufficient, but if all fouling is not removed, as determined by careful visual inspection of the bore and of the wiping patches, repeat as described above.

f. After properly cleaning with either the swabbing solution or the standard solution, as has just been described, the bore should be clean and safe to oil and put away, but as a measure of safety a patch should always be run through the bore on the next day and the bore and wiping patch examined to insure that cleaning has been properly accomplished. The bore should then be oiled, as described above.

g. If the swabbing solution or the standard metal fouling solution is not available, the barrel should be scrubbed, as already described, with the soda solution, dried, and oiled with a light oil. At the end of 24 hours it should again be cleaned, when it will usually be found to have "sweated"; that is, rust has formed under the smear of metal fouling where powder fouling was present, the sur-

face being puffed up. Usually a second cleaning is sufficient, but to insure safety it should be again examined at the end of a few days, before final oiling. The swabbing solution should always be used, if available, for it must be remembered that each puff when the bore "sweats" is an incipient rust pit.

h. A clean dry surface having been obtained, to prevent rust, it is necessary to coat every portion of this surface with a film of neutral oil. If the protection required is but temporary and the arm is to be cleaned or fired in a few days, sperm oil may be used. This is easily applied and easily removed, but has not sufficient body to hold its surface for more than a few days. If rifles are to be prepared for storage or shipment, a heavier oil, such as cosmic, must be used.

i. In preparing arms for storage or shipment they should be cleaned with particular care, using the metal-fouling solution as described above. Care should be taken, insured by careful inspection on succeeding day or days, that the cleaning is properly done and all traces of ammonia solution removed. The bore is then ready to be coated with cosmic. At ordinary temperatures cosmic is not fluid. In order, therefore, to insure that every part of the surface is coated with a film of oil the cosmic should be warmed. Apply the cosmic first with a brush; then, with the breech plugged, fill the barrel to the muzzle, pour out the surplus, remove the breech-block, and allow to drain. It is believed that more rifles are ruined by improper preparation for storage than from any other cause. If the bore is not clean when oiled—that is, if powder fouling is present or rust has started—a half-inch of cosmic on the outside will not stop its action, and the barrel will be ruined. Remember that the surface must be perfectly cleaned before the heavy oil is applied. If the instructions as given above are carfully followed, arms may be stored for years without harm.

j. Preparation of solutions:

Soda solution.—This should be a saturated solution of sal soda (bicarbonate of soda). A strength of at least 20 per cent. is necessary. The spoon referred to in the following directions is the model 1910 spoon issued in the mess outfit.

Sal soda, one-fourth pound, or four (4) heaping spoonfuls.

Water, 1 pint or cup, model of 1910, to upper rivets.

The sal soda will dissolve more readily in hot water.

Swabbing solution.—Ammonium persulphate, 60 grains, one-half spoonful smoothed off.

Ammonia, 28 per cent., 6 ounces, or three-eighths of a pint, or 12 spoonfuls.

Water four ounces, or one-fourth pint, or 8 spoonfuls.

Dissolve the ammonium persulphate in the water and add the ammonia. Keep in tightly corked bottle; pour out only what is necessary at the time, and keep the bottle corked. Use a rubber cork.

Standard metal fouling solution.—Ammonium persulphate, 1 ounce, or 2 medium heaping spoonfuls.

Ammonium carbonate, 200 grains, or 1 heaping spoonful.

Ammonia, 28 per cent., 6 ounces, or three-eighths pint, or 12 spoonfuls.

Water, 4 ounces, or one-fourth pint, or 8 spoonfuls.

Powder the persulphate and carbonate together, dissolve in the water and add the ammonia; mix thoroughly and allow to stand for one hour before using. It should be kept in a strong bottle, tightly corked. The solution should not be used more than twice, and used solution should not be mixed with unused solution, but should be bottled separately. The solution, when mixed, should be used within 30 days. Care should be exercised in mixing and using this solution to prevent injury to the rifle.

Neither of these ammonia solutions have any appreciable action on steel when not exposed to the air, but if allowed to evaporate on steel they attack it rapidly. Care should, therefore, be taken that none spills on the mechanism and that the barrel is washed out promptly with soda solution. The first application of soda solution removes the greater portion of the powder fouling and permits a more effective and economical use of the ammonia solution. These ammonia solutions are expensive and should be used economically.

k. It is a fact recognized by all that a highly polished

steel surface rusts much less easily than one which is roughened; also, that a barrel which is pitted fouls much more rapidly than one which is smooth. Every effort, therefore, should be made to prevent the formation of pits, which are merely enlarged rust spots, and which not only affect the accuracy of the arm but increase the labor of cleaning.

l. The chambers of rifles are frequently neglected because they are not readily inspected. Care should be taken to see that they are cleaned as thoroughly as the bore. A roughened chamber delays greatly the rapidity of fire, and not infrequently causes shells to stick.

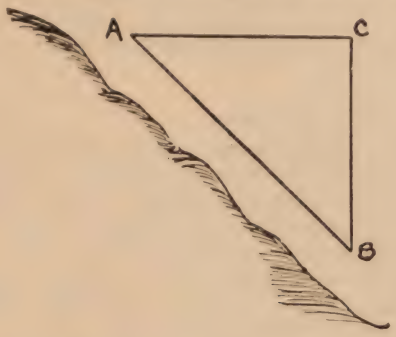
m. Rifles should always be cleaned from the breech, thus avoiding possible injury to the rifling at the muzzle which would affect the shooting adversely. If the bore for a length of 6 inches at the muzzle is perfect, a minor injury near the chamber will have little effect on the accuracy of the rifle. The rifle should be cleaned as soon as the firing for the day is completed. The fouling is easier to remove then, and if left longer it will corrode the barrel.

n. The principles as outlined above apply equally well for the barrel of the automatic pistol. Special attention should be paid to cleaning the chamber of the pistol, using the soda solution. It has been found that the chamber pits readily if it is not carefully cleaned, with the result that the operation of the pistol is made less certain.

Hillside Shooting with Rifle

Let *A* be the position of the hunter, *B* the postion of the animal aimed at on mountain side. The solution is: In aiming, be governed by the horizontal distance *A C*, or distance to a point perpendicularly over the animal. Reversing the positions, with the hunter at *B* and animal at *A*, in aiming be still governed by the horizontal distance *A C*. In other words, take no account of the height (*C B*) you may be above the animal, or the air line distance, *A C*, which is much more easily estimated than the distance *A B*, generally thought to control the aim. In afterward bringing these principles into practice, I never failed to hit my game. The last time they were used upon two bull elk, at least 200 yards down a mountain side,

which was estimated to be much further. From an overestimate of distance the two first shots missed. Taking new reckoning of distance, and making use of above prin-



ciples, the elk standing apparently dazed from the unexpected reports, the next eight consecutive shots were put through the two elk before getting out of reach.—*W. D. P.*

Estimating Distance

Overestimating distance of game is a mistake that is amazingly common. It will almost always occur with beginners, except when game is across water, across smooth, clean snow, or from one high hill to another where the intervening valley has a broad bottom. In these three cases underestimating distance is the rule.

Overshooting

The tendency to overshoot game with a rifle is one of the remarkable and inexplicable things about hunting, and this tendency is especially strong on running game. For this reason file the back sight flat on top. If the sides are higher than the center notch, there will be a constant tendency to shoot too high from trying to see your game above them. With a little practice you can catch this sight quite as quickly and shoot just as well as with the back sight, which for good work, is only a useless nuisance. I go still further, and cut down the sides about one-twentieth of an inch, leaving about one-sixteenth of

an inch on each side of the center notch (which is simply a fine split) standing above the rest of the sight. Over the sides of this I can get a clear view of the whole body, even to the feet of a deer in any way he may run. I find that I can catch this sight just as quickly as any other, after a little practice, and am not half so apt to overshoot.—*Van Dyke.*

Rifle Shooting in Cover

In hunting in the woods you must watch three things: 1st your sight, 2d the deer, 3d the trees. Where trees are very thick it is often best to pick out an open place and throw your sights into that, firing just as the deer gets within the right distance from them. But be sure and not wait until he touches the line of your sights or you will miss him if he is going at any rate of speed or is at any distance.

An old deer hunter of the Southwest says that in firing at a running deer with his .30-30, he always fired his first shot just under the nose and worked back until the deer dropped. Due to difference of rifles, speed of deer, angle of running deer and many other conditions, no one rule for "lead" can be given. Practice, and lots of it, is what you need.

Rifle Hints for Shotgun Hunters

The first thing to be done when a deer starts is to remember that you have a rifle in your hands and not a shotgun. The number that can be missed, even inside of 25 yards, with a rifle fired as a shotgun, by good shots on quail or woodcock, is perfectly amazing. A deer in market or in a picture looks quite large, but in reality they are a very small mark. There is around them an immense amount of vacancy, and the tendency of a bullet to find it is marvellous.—*Van Dyke.*

Coolness in Rifle Shooting

Remember that coolness is absolutely indispensable and that haste will do you no good. Let quickness come with time, and practice slowly and carefully. Do not be beguiled into fast shooting at that Creedmoor target; make it your first point to hit, and don't shoot at first more than

once on one run, unless you have a double-barreled rifle. Let others try to see how big a hailstorm of bullets they can get up in a given time if they like it, and don't be at all bothered, if by so doing they happen to make more points than you. You will in the end do by far the best work on game if you take it easy and make accuracy the first point.—*Van Dyke.*

Rifle Shooting

Hold the butt firmly against the shoulder (close to the body), not on the muscle of the arm. Extend the left hand along the barrel, and hold it firmly with the fingers. The elbow should form a very obtuse angle. Press the trigger with a steady squeeze, but do not jerk or twitch it.

The Rifle on Deer

Use a rifle having the flattest possible trajectory up to 150 yards, and never raise the sights (taking coarse front sights or holding high on game) unless very certain of its necessity, and when in any doubt always decide on the level sight. If not very familiar with the trajectory of your rifle, you will be apt to miss deer by holding a level sight on them and having the ball drop under. And after you do know their trajectory, you will be extremely liable to undershoot in trying to avoid the danger of overestimating distance, and to overshoot the next one, perhaps, in trying to avoid the previous error. Paradoxical as it may seem, the longer the range of a rifle the worse it is for hitting game from 90 to 200 yards. Don't shoot at the middle of a deer. A deer hit anywhere from three inches back of the shoulder to the hip, unless the backbone or kidneys be touched, can run for miles unless shot with an extra large ball or soft-nosed bullet, and often even then unless the ball breaks up effectively. In such case let it alone until it lies down and sickens, and don't go after it even then, if you can possibly get around or above it for another shot. In, or just behind the shoulder, about one-third the way up, is the best place to shoot, if you can get a chance; but you will have to take shots just where you can get them, especially on the run.

Shooting Bounding Deer

Generally a running deer is a bounding deer and often a bouncing deer. The deer often runs as if bouncing on India rubber, rising, apparently without effort, from 1 to 2 feet at every jump. When running over ground that is rough, rocky, covered with logs or low brush, a deer is nearly always jumping with high and often irregular springs. Now (unless very close), just as surely as you shoot at where he is, just so surely will the ball strike where he is not. The best way is to catch him as he strikes the ground, and for this purpose, where you have time, you must keep the rifle ahead of him for several bounds, until you catch the length and height of his jump. Then, when he is at the highest point, shoot at the spot where he will be when he strikes the ground, and, above all, be sure and pull when he is in the air. To get the right distance ahead, and at the same time the right elevation, and pull just at the right time, is a very nice operation, and a miss is never discreditable; but, with care and coolness, you will in this way make shots over which you will chuckle for a month. If a deer be running low you may disregard this up and down motion, and if running very fast you must disregard it; but when bounding high you cannot overlook it with safety, and in straightaway shots you must hold about for his knees when he is up. —*Van Dyke.*

Driving Deer

Deer have certain runs, generally upon the dividing ridges and through the swags of ridges. Standers are placed on these runs and the driver generally drives against the wind, which is the way deer, especially old bucks, always run. The deer hunter that understands his business, in taking a stand to wait for the driver to drive out the deer, always takes his position against a tree, fronting the way he expects the deer to come. In standing for deer you should never get behind anything, for the deer is almost certain to see you move, and then he will change his direction.

Still-Hunting Deer

The best time for still-hunting is in running time, in

the months of October and November, after the does are with fawns and are running and hiding from the bucks. When you see a doe running through the woods, go and take your position in shooting distance of where she passed, and keep a sharp lookout the way she came, and often, in a very few minutes, you will see a buck coming, tracking her. Let him come up near enough for you to get a fair shot, bleat or whistle at him and he will stop. If you are a marksman, then you will have venison. Still-hunting in the months of October and November is the most successful way of hunting. Sportsmen who are good rifle shots are the most successful still-hunting. Shotguns will do for driving, but rifles are the best to use in still-hunting.

Slow-Tracking Deer

Slow-tracking deer with a dog is a very successful way of hunting. The dog, from a small puppy, must be trained. A half-hound is generally preferred—a cross of a hound and airedale or shepherd—as the hound gives the acute scent, and the airedale or shepherd the intelligence. The dog is trained to follow the track by scent in a slow walk, and you follow the dog ten or twenty feet behind, and keep a sharp lookout for the deer. When the dog has a strong scent of the deer you can discern it by the precaution he uses, and when he sees them he stops and waits for you to shoot, and at the fire of the gun he does not break and run, but waits to see what you want done. If you have crippled the deer urge him on, and if it be badly crippled he will catch it and kill it, and you wait on the track where he started from when you urged him, and he will return and take you to the dead deer. This is the most successful way of hunting, and by it you can find out more about the habits of the deer than from any other mode of hunting.

Dead Deer in Water

A deer in the red coat sinks, while that in the blue coat floats, without regard to the fatness or leanness of the animal.

Deer and Moonlight

Where deer are comparatively undisturbed they feed nearly as much in the day as in the night, when the moon is up. If the moon has shone all night they will lie quiet all the next day. When the moon has been up all day they will lie quiet all night. During the last quarter of the moon, when the moon has been down nearly all day, they become very hungry and feed nearly all night.

Hanging up a Deer

After inserting a gambrel in the hindlegs of the animal in the usual manner, cut a couple of crotches about eight feet long, then bend down a springy sapling and insert the top under the gambrel. Now place your crotches, butt outward, at right angles to the sapling, hook one of them into the sapling, just below the gambrel, and place its butt so it will not slide; now, with the top of the other crotch in your hand, lift up on the sapling, pressing it against the crotch at the same time. When as high as you can get it, insert the other crotch above the gambrel. If the sapling is not strong enough to hold the weight of the deer, carry the foot of this crotch toward the other and the thing is done. If the deer is very large, or your muscular energy small, you can start with crotches three or four feet long and then use longer ones.

Section III.

PISTOLS AND REVOLVERS

Pistols

The term "pistol" is applied properly only to single-shot weapons. They were originally of large calibre, smooth bore and not particularly accurate. The military equipment of army and navy officers as early as the sixteenth century included a pistol. The most that was expected of these weapons was to hit a man at fifteen or twenty paces; after that they were thrown or used as clubs.

The first marked improvement in the accuracy of pistols was the result of rifling the barrels and the adoption of the conical bullet. These discoveries added to their range and effectiveness. The use of the pistol today is confined to target shooting. The barrel of the modern target pistol is from six to ten inches long; the sights are capable of delicate adjustment. The trigger pull is lighter than that of the revolver. Those of the best makers are extremely accurate. They are built in various calibres; the .22 being the most popular.

American pistol makers lead the world in the design, accuracy and the workmanship of their weapons. Their weapons with good holding are capable of placing ten shots in a two-inch circle at fifty yards. There is only one muzzle-loading pistol maker of importance, the celebrated Gaston Rennette of Paris. His weapons conform in weight, size and design to the dueling code. They are models of exquisite workmanship and accuracy but being muzzle-loading are slow to manipulate.

Revolvers

As the name indicates, a revolver consists of a single barrel with a revolving cylinder containing the cartridges. The raising of the hammer revolves the cylinder sufficiently to bring the loaded chamber in line with the barrel. The cylinder of the modern revolver holds five or six car-

tridges; they can be discharged in turn, before it is necessary to reload. The accuracy of the revolver depends to a considerable extent upon the degree of precision with which the chambers of the cylinder aligns with the barrel. If the revolving cylinder is not brought into a perfect alignment, the bullet does not enter the barrel truly—a trifle of lead will be shaved off of one side. This throws the bullet off balance in its flight and is fatal to accuracy. There is also a slight escape of gas at the junction of the cylinder and the breech end of the barrel which does not improve the accuracy or add to the energy imparted to the bullet.

The American revolver is the best in the world and those of the higher grades are models of mechanical precision and beauty. In this class of weapons the difficulties that have been mentioned above have been largely overcome by skillful workmanship.

Automatics

The automatic pistol is the most modern of multiple-shot hand weapons. It differs from the revolver in its method of operation; the cartridges being contained in a clip which is inserted in the handle, and are in turn introduced into the chamber of the barrel by simple but ingenious mechanism operated by the recoil of the preceding shot. The modern automatic is practically as simple as the revolver and has the advantages of eliminating the escape of gas between the cylinder and barrel and seating the bullet in the barrel truly.

The automatic has grown steadily in popularity. It has been adopted for military purposes and it is also coming into more general favor for police, home protection and target use. The revolver advocates claim that automatics balance poorly and consequently are more difficult to learn to shoot accurately. The line of sight being considerably higher than the grip, renders it imperative that they be held perfectly still, shot after shot. Their long, creeping trigger pull, also, is criticized as not conducive to accuracy.

Ammunition

The manufacturers of ammunition have produced a wide range of cartridges covering the entire range of pocket, personal defense and military weapons and those used for target purposes. This ammunition is of two types, rim fire and central fire. The pistol and revolver shot, therefore, will have no difficulty in securing a size and load that will suit his purposes and satisfy his desires.

Rim-Fire Ammunition

In rim-fire ammunition a small deposit of the Fulminate of Mercury is deposited on the inside of the base of the cartridges. It is in general use in the .22 calibre, and was formerly popular in .32 and .38 calibres and is occasionally met with in old-fashioned Derringers and single-shot pistols of obsolete type. All of these large calibre rim-fire cartridges are lacking in uniformity, reliability and accuracy.

The .22 short, which is so largely used for gallery shooting and short range out-of-door work, carries powder—3 grains, lead—30 grains. It has a light report, fouls very little and is remarkably accurate up to 40 yards. The surface of the bullet outside of the cartridge is lubricated and care should be taken to prevent it being rubbed off as when this happens there is a loss of accuracy and increased liability to leading the barrel.

The .22 calibre long-rifle cartridge, powder—5 grains, bullet—40 grains, is extensively used for pistol-shooting. It is a well-balanced load and the most accurate of all .22-calibre ammunition. This cartridge in a ten-inch barrel will shoot inside of a 2-inch circle at 50 yards regularly and at 100 yards inside of a 5-inch circle. The .22-calibre Winchester, another popular and more powerful cartridge, is loaded with powder—7 grains, bullet 45 grains. The bullet has a flat point, making it more suitable for small game, and as the lubrication is inside they can be carried loosely in the pocket.

For those who want a still more powerful cartridge, the .25-calibre Stevens is recommended. The powder load is 11 grains, bullet—67 grains.

Central-Fire Cartridge

The central-fire cartridge is essentially modern and a great improvement over its predecessor, the old-fashion rim fire. In cartridges of the central-fire type a small metallic cap is embedded in the center of the base of the cartridge. These caps, after shooting, can be removed so that the cartridge can be reloaded again and again. The lubrication of the bullet is inside the shell which renders them less liable to injury and they can be reloaded if desired.

The .32-calibre Smith & Wesson cartridge, powder—10 grains, bullet—88 grains, is adapted to the S. & W., Colt and Iver Johnson revolvers. It is accurate at short ranges and fairly accurate up to 40 yards. Single-shot pistols are sometimes chambered for this load; the gallery charge being powder—4 grains and a round bullet of 47 grains. The .38 Smith & Wesson long and the .38 Colt New Police are both more accurate cartridges. They are loaded with powder—13 grains, bullet—100 grains. This cartridge is much more powerful than the .32 and is a reliable charge for a pocket weapon.

There are two other important cartridges in this field adapted to the Smith & Wesson and Colt revolvers. One of them is the .38 long, powder—18 grains, bullet—150 grains and the Smith & Wesson Special, powder—21½ grains, bullet—158 grains. Both of these cartridges are exceedingly accurate at 100 yards. Groups of six shots in a six-inch circle at 100 yards can be made.

Smokeless powder gives good results in revolvers of this calibre.

A number of years ago the Russian government adopted a revolver that was remarkably well balanced. It was powerful enough for military service, remarkably accurate and easily adapted to a variety of loads. These revolvers were manufactured by the Smith & Wesson Company and were known as the Russian model. They were single action and operated on the tip-up principle; the barrel and cylinder being hinged on the frame and operated by raising a catch just in front of the hammer. The ejecting device was automatic and the system, while not as sturdy as the solid frame, had several advantages, among

them, cleaning from the breech. Many of the greatest records in revolver-shooting have been made with the Russian Model .44 and many reduced charges have been evolved, varying from 7 grains of powder and 110 grains of lead,—this load at 20 yards will group 12 shots in a 1-inch circle,—up to the heaviest load which is 23 grains of powder and 246 grains of lead; with this load at 200 yards, 12 shots can be placed in a 15-inch circle.

In addition to these revolvers, there is a Colt double action .41 calibre using both long and short cartridges. The Single Action Army Colt remains a favorite as a belt or holster gun. Its mechanism is strong and will stand an unusual amount of hard usage. As used on the frontier, it was chambered for both the .44 and .45 calibre.

The .45 Colt is the most powerful of all American weapons and was the standard U. S. Government equipment. With the regular loads the recoil, however, is excessive and they were difficult to shoot with accuracy. In recent years the powder charge has been reduced to 28 grains which was a much more accurate load.

The sights of the ordinary pistol or revolver are very simple and do not present the variety to be met with in rifles. In match contests, peep and bead sights are barred; consequently only open sights are admissable.

In military and pocket weapons, the front sight is usually a flat piece of metal set on edge. It does not follow any particular shape and is conspicuous by its simplicity. For target pistols the front sight is generally given some special shape; the most popular being a design that when viewed through the rear sight, appears like the head of a pin.

The rear sight on every-day weapons consists simply of a plain bar placed tranversely to the barrel just in front of the hammer. This bar is notched at the top with a "V" or "U" through which the front sight is aligned.

Target Sights

There are a variety of sights used for target purpose, conspicuous among them being the Paine sights which were invented by the celebrated pistol shot, Chevalier Ira Paine, and were used by him in all of his matches. They

Side view. End view. Side view. End view.

Front Sights.

Rear sight. Appearance when aiming.

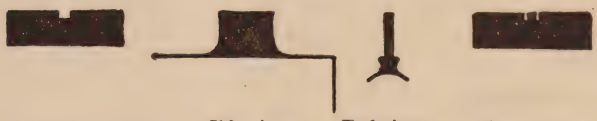
Military Sights.

Rear sight. Side view. End view. Appearance when aiming.

Front sight.

"Paine" Sights.

FIG. 38.



Rear sight. Side view. End view. Appearance when aiming.

Front sight.

PARTRIDGE SIGHTS

are illustrated herewith; the front sight is the pin head or bead sight; the rear sight is the flat bar with a semi-circle notch. In recent years the sights used by Mr. E. E. Partridge have become very popular. As will be seen by the illustration, the front sight is plain, square and flat topped and the rear sight again is simply a plain bar with a square notch. In aiming, the flat-topped front sight is brought into alignment with the square notch of the rear sight, leaving simply a thin area of light on the three sides as illustrated herewith.

It is possible to introduce a great deal of variety into the sights of target pistols and they are built usually with a permanently-fitted base to which various slides can be attached and changed from time to time until the shooter finds something that suits him.

A general working rule that has been taught by experience is that the edge of the front sight presented towards the eye should be square and that the notch of the rear sight should be bevelled concavely towards the front.

Selection of Pistols

The purchase of a pistol or revolver is something in which you will never regret the expenditure of a few extra dollars. The highly-developed methods of the best American makers enable them to produce beautiful revolvers and pistols at a price that is within the reach of everyone. Avoid the cheap weapons of foreign makers; they do not compare either in finish, workmanship and accuracy with those made in America. Most of them are unreliable and many of them unsafe. The names, Colt, Smith & Wesson, Remington, Stevens, Savage

The grip must fit the hand

and Iver Johnson—all stand for something to which the American shot can pin his faith.

Be sure that the weapon you buy fits your hand. This is important; it will have much to do with the accuracy of your shooting. The way to go about deciding the important questions of weight and balance and the fit of handle is to examine the various models of the different makers and select the one that feels and handles right. If the gun you select fits your hand, the first joint of the trigger finger will touch the trigger when that part of the finger is bent at right angles to the barrel. This brings it into a position where a steady squeeze can be given the trigger without tending to pull it sideways.

Position

In the days of dueling, the popular position was to stand with the right side towards the target, the idea being that thereby you presented a smaller mark and it was also argued that in this position the right arm protected the vital portions of the body. However this may be, it was not a natural or an easy position. It necessitated twisting the head around to one side, which for one or two shots might not have been any disadvantage. It would, however, be a most fatiguing position if continued in for a series of shots. There is considerable nervous strain and muscular effort associated with shooting through a long match. It is advisable, therefore, to cultivate an easy, natural position; a position that can be maintained with a minimum of fatigue. The man who shoots in an easy position has an advantage over his opponents that will count in a long match.

It should be born in mind, nevertheless, that there is no fixed position for shooting. It is something that will have to be determined by each individual. As a rule, however, nearly all good shots face a trifle towards the left of the target, the right foot advanced six or eight inches ahead of the left and pointing directly towards the target, the body perfectly balanced, the weight being equally distributed on both legs. The shooting-arm is usually fully extended. There are good shots who stand with both feet close together and there are others who

do not fully extend the arm. Some men close one eye in shooting, while other good shots shoot with both eyes open. The late Walter Winans, a careful student of everything pertaining to the art of pistol-shooting and one of the greatest shots of modern days, had a style

Well poised and firm

that was more or less particularly his own. Mr. Winans stood in a perfectly-balanced position, his weight equally distributed. He then clamped his left arm close to his left side; the idea being that it added to the rigidity of the body.

Keep Your Eye on the Bull's-eye

The eye can be focused only on one distance at a time, therefore focus on the bulls-eye. This will cause the sights to blur slightly, but it will give you a clear definition on the bulls-eye which is the important thing, and the front and rear sights of your pistol will naturally fall in the line of view.

Shoot With Both Eyes Open

Learn to shoot with both eyes open. It reduces the strain on your eye and gives you a clearer vision. In the beginning close one eye as usual, aim steadily at the mark and gradually open the closed eye. At first you will find it difficult to continue the aim on the target, but this will be overcome with practice, and in a short time you will have no difficulty in either beginning the aim or continuing it with both eyes open. Stick to this method of aiming and you will be a better shot.

Eyes Blurring

Do not rub the eyes when they blur; to do so aggravates the condition. Blurs are the result of various causes. Remember that if the eye is closed for any length of time it loses its focus. Therefore, if you have had your eye closed, after opening keep it on the target for a few moments before beginning shooting. Vision will gradually clear; then begin shooting.

Watery eyes, caused by strain on the eyes, will be relieved by shooting with both eyes open. In shooting against the wind powder gasses are blown back which irritate the eye. In these cases glasses offer some relief. A gun that is heavily oiled, in warm weather throws off into the air a thin spray of oil with each discharge; this sometimes forms a film on the eyeball. The eye cup should be part of the equipment of every shooter. Bathing the eyes frequently in cold water strengthens them. A solution for inflamed eyes that has been in use for many years is sulphate of zinc, two grains; distilled water, one ounce; five drops in the eye night and morning. Another treatment is two drops of a 10% solution of

argyrol in the eye followed in two hours with the use of an eye cup and a 5% solution of boracic acid.

Trigger Squeeze

The popular conception in regard to squeezing the trigger is that the expert shot waits until the sights are aligned perfectly with the bulls-eye and then presses the trigger as a matter of fact. The expert does not know exactly when the discharge takes place. What he really does, is to keep the sights aligned on the bulls-eye as accurately as possible. It is impossible to prevent them weaving back and forth and up and down—while this is going on, he puts a steadily increasing pressure upon the trigger. He does not squeeze the trigger faster when the sights are in perfect alignment. To do so would deflect the muzzle and make the shot go off the mark. He simply keeps up the pressure so steadily and so smoothly that he is not conscious of the exact moment of the discharge. The finger with constant practice becomes trained to hold the pressure when the sights weave off the mark. As the sights line up again, the pressure is increased until finally the hammer falls. This is the secret of becoming a master of pistol and revolver shooting.

MANAGEMENT OF DOGS

Kennels

A dog always should be provided with a clean, comfortable bed. If allowed to sleep in the house, an excellent arrangement is a framework over which is tacked a piece of canvas or heavy burlap that from time to time can be removed and washed. If the dog sleeps out of doors, it is advisable to construct a kennel with a front that can be raised, so that it can be easily cleaned. If the dog is kept on a chain, have the chain fastened to a ring that slides upon a wire stretched from a post close to the kennel to another post or tree some distance away. Oat straw makes the best bedding and it should be stirred up every day and changed once a week. The ground about the kennel should be cleaned every day, and once a week the kennel should be scrubbed with boiling water, and once a month apply a coat of whitewash; destroy all bad smells, insects and vermin by daily sprinkling around the kennel a weak solution of crude carbolic acid.

Fumigating Kennels

Place some sulphur in an iron vessel and pour a little alcohol on it. Set fire to the alcohol, which will ignite the sulphur. Take out your dogs and put the vessel into the kennel.

Separating Fighting Dogs

Choking off, douching with water, etc., will sometimes answer, but very game dogs will hang on, even under a pump, and choking off is sometimes somewhat dangerous. A certain means is showering something over the dogs that will produce sneezing. Be his will ever so good, the motion of sneezing involuntarily opens his jaws. Pepper answers very well, but snuff is probably the best, as it can be used *ad libitum*, and will certainly produce the effect if enough is used.

Exercise

Dogs require plenty of exercise, and without it are unhealthy and liable to attacks of skin disease, indigestion, constipation and other bowel complaints. Active breeds like collies and setters get sufficient exercise if allowed a thirty-minute run twice a day. Large breeds like St. Bernards require a slow walk for at least an hour every day, otherwise their bones and muscles do not develop properly. Pet dogs should be given a run every day, a good idea being to teach them to chase a rubber ball indoors.

On returning from exercising your dog, examine its feet for cuts, pieces of glass, thorns or splinters. The old adage that a grooming is worth more than a feed is true of dogs; they should be brushed daily. Brushes and combs will remove snarls and burrs, but after the coat is straightened out and the snarls removed, nothing is so good for the coat as rubbing with the hand.

Washing

Dogs should be washed at least once a week during warm weather, and as often as necessary to keep them clean during cold weather. In summer, if the day is warm, they may be washed out of doors, but if the weather is at all chilly, the washing should be done in a properly heated room and the animal not allowed in the open air until the skin and coat are perfectly dry. Large breeds may be washed in an ordinary tub; a foot-pan will answer for small dogs. Fill the receptacle with lukewarm water and then begin at the neck and moisten the entire coat; then apply Dent's Dog Soap, rubbing it into the coat, gradually adding more water and carefully rubbing the dog until a profuse lather is produced; after two or three minutes, rinse with clean water and dry with a coarse towel; those made from salt sacks will prove satisfactory for large dogs, small dogs requiring softer towels. Long-haired toys, such as Yorkshires, should be dried by brushing with a couple of hair brushes, alternately used and warmed before a fire.

Feeding

In his primitive or wild state, a dog thrives on an all-meat diet, but when the life led is artificial and the opportunities for exercise limited, a diet of Spratt's Dog Cakes, which is a perfectly balanced ration, will be found more wholesome. In any case, eating or gnawing the dry cakes induces a flow of saliva, thus helping the digestive organs, keeping the teeth free from tartar and the gums strong and healthy. It is for this reason that dogs are to be found (under unusual conditions, perhaps) that never have a dog's solace, viz., a big bone, and yet whose mouths are in as good condition as if they had. "Dogs should be fed twice daily, a light meal in the morning, and a heavier meal at night. They should never be allowed to gorge themselves, but as soon as they appear to have enough the remnants of the meal should be removed."

Breeding

A bitch is said to be on heat or in season, when she is in breeding condition. This condition is recognized by the swelling of the parts, and the escape from them at first of a little clear mucous discharge, followed by a red discharge which continues for nine or ten days, or sometimes a little longer, and this is again followed by a white and somewhat mattery discharge for another few days. A sure sign that a bitch is coming into use is the attention paid to her by any dogs in the kennel. The first heat generally occurs when the bitch is eight or nine months old, though in some breeds it occurs earlier or later. With foreign dogs, such as the Eastern breeds, and particularly Chows, the first heat often appears as early as the fifth month, whilst in the case of Toy dogs it may not occur until the bitch is a year old.

After its first appearance the heat should recur regularly about every six months, but there are a few exceptional cases in which it comes on about every four months, and as a rule this means that the bitch is barren.

Bitches sometimes have what is called a false heat, when they come on some time before they are due, and this condition is indistinguishable from a true heat as the bitch may even stand to be mated; but she does not breed,

and just when she should be whelping she comes on again and may then be mated with every chance of success.

There is no advantage in waiting till the colored discharge has ceased before mating a bitch, the best time to do so being as soon as she will stand to the dog, and this as a rule is when the colored discharge has shown for a few days. Sometimes there is a little mattery discharge for a few days after mating, but if not profuse it is of no consequence and may be disregarded. If, however, it is profuse, or the bitch seems ill, feverish and off her food, the passage should be syringed night and morning with from a quarter to a pint of tepid water, in each half-pint of which add a tablespoonful of boracic acid.

When to Breed

Do not breed from a bitch under 18 months old. Let her mate excel in points in which she is deficient. Don't breed brother and sister or parent and pup. Hunt the bitch occasionally while in pup, and feed well but not too much. Don't weaken the bitch by making her raise too many pups. Six or seven is a plenty. Give her a warm kennel and let her run loose, free to go or come. Pups may be weaned when 6 or 8 weeks old.

Raising Puppies

If you expect to raise healthy puppies, first look to the health of the prospective sire and dam. Start right, or not at all. It is always a good idea to treat for worms a bitch that is expected to raise a family, not because there is any possibility of a puppy inheriting worms from its dam, but because a bitch affected with worms is always passing thousands of worm eggs. These become attached to the bitch's coat and teats and are scattered over the bedding and kennel floor, so that the puppies of a bitch infested with worms, or puppies brought up in a kennel occupied by infected dogs, are almost sure to take these eggs into their stomachs with the first mouthful of milk they draw from their dam. The eggs of the ordinary round worm will develop in two or three weeks, and in this way the presence of masses of worms in suckling

puppies is accounted for. It is evident, therefore, that, by treating the dam for worms two or three weeks before she is due to whelp, by washing the kennels and sleeping boxes with a strong solution of carbolic acid, as well as giving the dam a bath a few days before she whelps, rubbing precipitated sulphur into her coat and over her teats, worms and the diseases they give rise to can be avoided to a great extent. Prior to whelping, a bitch should have plenty of wholesome food, raw meat being

one of the very best things that can be given her. It is also quite important that a bitch's food contains bone-making material; otherwise the bones of her offspring will have too large a percentage of gristle, and will fail to attain their proper development, displaying a tendency to rickets. With some of the larger breeds, the best food that can be given is apparently deficient in bone-making materials, so that it is advisable to mix with the food of all bitches in whelp a proportion of precipitated phosphate of lime. The amount for a medium-sized bitch, such as a hound or a bird dog, is an even teaspoonful mixed with

food once a day during the first month, and twice a day during the second, and it can be continued during the nursing period.

Weaning Puppies

After puppies are whelped and the dam is doing well, too much importance cannot be attached to the desirability of leaving them alone—that is after providing for their use a warm, dry, quiet and comfortable nest free from drafts, and also from flies, for one or two of these pests will keep a bitch and her puppies miserable and sap their vitality in a way that interferes with healthy or natural growth. When puppies are four or five weeks old, the subject of weaning can be considered. Keep the bitch away from the puppies for gradually increasing periods—at first an hour a day, then two, three and four hours at a time; then allow her to be with them for an hour or two in the morning, an hour in the afternoon, and all of the night, as at this time they require her presence to keep them warm.

It requires two or three weeks' time to wean a litter of puppies. This is one of the critical periods of their lives, and the changes in food must be slow and gradual, and the effect carefully watched. Milk is, of course, the staple diet. Most authorities recommend that at this time cows' milk be diluted one-fourth or one-half with water. This is a great mistake; the bitch's milk is fully forty per cent. richer than cow's milk, and a far more rational procedure would be to thicken cows' milk with cream before introducing it to suckling puppies.

To teach puppies to lap milk simply stick their muzzles into the pan and allow them to lick their noses clean. After this has been done a few times, their natural inquisitiveness will get their noses into the pan, and in the course of three or four days, they will lap milk very industriously. The milk can then be thickened with stale bread, broken crackers or well-boiled rice. As a rule, by the time puppies are six weeks old, they will lap milk readily, and the more precocious will pick out more substantial food, such as a crust of bread, and make feeble attempts at gnawing it.

In the course of another week or ten days, they will manage to get away with food softened in milk, from this time on becoming most voracious. Those thrive best which are fed small quantities at frequent intervals about every four hours; puppies which are from four to six months old should be fed four times a day, and from that time up to a year old or maturity they require feeding three times a day. Some do better on one thing than another, but as a general proposition, there is nothing like Spratt's Dog Cakes; day in and day out they will be found a perfectly balanced ration. Fat meat, rich gravies and pastry are difficult for a dog to digest, and must be used accordingly.

Puppies of one litter can be kept together until they are four or five months old, after which they do much better if separated, or kept in pairs, thereby becoming company for each other. If possible to do so, allow puppies complete liberty, so that they may come and go as they please; in this way they gain confidence in themselves and their constant explorations enlarge their knowledge of things, stimulate their sensibilities and develop their mental qualifications.

Feeding Pups

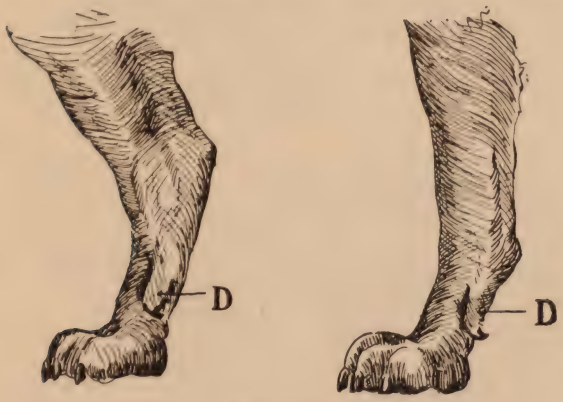
Pups should be fed three or four times daily up to their sixth month, and then but three times. Feed Spratts puppy cakes until second teeth are well up; they can be softened in milk, or mixed with scraps from the table made soft with milk or gravies that are not greasy. All grease, except butter, should be avoided, and all vegetables must be finely mashed so that dogs can digest them. Old dogs can easily digest bones, but not hard pieces of vegetables. Bones should be kept from pups, except large ones to gnaw and work at while cutting teeth. Feed pup at each time in bulk not over two-thirds the size of its head or you will overload its stomach and it will not do well. You will find a meal once or twice a week of good, rich buttermilk will be an acceptable dish for growing dogs, as it keeps their blood pure, bowels loose, and makes their skin clean and hair glossy.

Teething

A puppy is born without teeth, but by the time it is from five to eight weeks old has twenty-eight, called puppy or milk teeth, which seldom give trouble whilst being cut. When about four months old, sometimes a little sooner, puppies, except Toys, commence to change their teeth, and by the time they are five months of age they have got a new set consisting of forty-two or forty-four. Toy dogs do not commence to change their teeth until a month later, and the dentition is not completed until perhaps the puppy is eight months old.

Removing Dew Claws

Always remove them when the pup is very young, their excision then being accomplished with a sharp pair of



Dew claws

scissors. First divide the skin and draw the dew claw to one side before it is detached, in order that the skin may afterward cover the wound.

Distemper

When a pup's permanent tusks are about half through, the temporary ones being still retained, look out for dis-

temper. It is most common in fall or spring. Moisture of the eyes and a short cough are the earliest signs. The dog seeks warmth, constantly shivers, and if touched, trembles violently. The discharge from the eyes becomes thick and purulent. A mucus or yellow fluid moistens the nostrils. If the dog is not attended to, the disease may seem to disappear in a few days, but it generally soon reappears. The germ of this disease has never been isolated, therefore there is no safe inoculation; those that are sometimes used are a mixed treatment of all kinds of bronchial germs and following their injection dogs frequently have fits, chorea, skin diseases and intestinal and bowel troubles that are more to be dreaded than distemper.

Nursing

Kennel a sick dog alone, in a warm, dry, well ventilated kennel, with a box or basket lined with straw to lie in. Change straw daily. Put a basin of cold water, changed twice daily, in reach. Remove evacuations promptly and sprinkle a disinfectant about. Keep the dog quiet and don't exercise, groom or wash him. Give medicines regularly at stated times, and never a double dose when a single dose has been omitted previously. A harsh word to a sick dog may bring on fits. See Administering Medicines.

Administering Medicines

To have their proper and desired effects, medicines should be given regularly and at stated times, and not, as some persons do, to give a double one because they forgot one. The medicine should be given quietly and without disturbing the dog, if possible. One person, as a rule, is sufficient to give it, if a little tact is manifested. If it be liquid medicine it is best given out of a small vial, one which will hold about an ounce. In administering medicine the person should stand in front of the dog, and with the left hand the muzzle of the animal should be held, the head slightly elevated, and the teeth kept nearly closed. The bottle containing the potion should be held in the right hand, and the neck of it placed within the

lips on the left side of the face, between the teeth and cheek. Then small quantities should be poured into the mouth, and on no account should a second quantity be given until the first has been swallowed. Some dogs are rather obstinate in taking medicine, and hold it in the

mouth some seconds before swallowing. Under these circumstances many people pinch the throat, with the idea of inducing the dog to swallow. This act is dangerous, as it often makes the patient cough, and, with the fluid in the throat, sometimes choke from drawing it into the windpipe. All that is necessary, in most cases, is a little

patience to keep the dog's head elevated, and he will soon swallow. In very obstinate cases the end of the nose may be pinched, which soon compels the dog to perform the act of deglutition. To give a pill or bolus, the upper part of the muzzle should be grasped and the lips pressed between the teeth. This forces the mouth open and it remains so, because the dog is afraid of biting himself. The head should then be elevated, and the pill or bolus dropped into the back of the mouth. The mouth must then be immediately closed and held until the dog has swallowed.—*Sewell.*

House Breaking

All house-dogs should be put out five or six times a day, and always the first thing in the morning and the last thing at night, besides immediately after eating.

Puppies, from the time they are weaned, can be taught to be clean and go to a box or tray containing mould, sand, or sawdust. To teach them they should be put on the box or tray several times a day, especially after feeding, and it is astonishing how quickly they learn to go to the box regularly.

Older puppies that have not been trained during early puppyhood are sometimes difficult to teach, and for a time require careful watching, and to be put out frequently. Some will often misbehave themselves in the house immediately after being put out—in such cases, after scolding the offender, he should be turned out again.

Many young dogs are clean in the house during the day, but are troublesome at night. Such dogs should be made to sleep in a closed basket for a time, and in the morning taken straight out of doors from the basket for a short run.

Kennel dogs that are constantly soiling their bed can be cured by giving the food on the bed, or, if this fails, by a change of bedding, say from straw to shavings, or—which is best of all—to a sack stuffed with straw for a bed.

Diseases of Dogs

WORMS: When treating a sick dog always consider the history of the case, and the liability to certain diseases

at certain ages or under certain conditions, and then look for symptoms to support this diagnosis.

The first question to ask yourself should be: "Is the patient suffering from worms?" The fact that all puppies and most old dogs have worms should arouse suspicion of their presence, which can be confirmed or refuted by

Common round worms

the presence or absence of certain symptoms that indicate worms, as follows: Eating dirt and rubbish, foul breath, hot, dry nose, hacking cough, variable appetite, rough coat, indigestion, colicky pains, frequent passage of urine, disturbed sleep, emaciation, blood-shot or pale, watery eyes, pale lips, vomiting or passing of slime, and an unnatural distention of the stomach disproportionate to the amount of food eaten. Worms also cause diseases of the stomach, poverty of the blood, general unthriftiness, an irritation of the skin resembling eczema, rickets, chorea and paralysis. Their removal is imperative and puppies which are not properly treated for worms invariably grow up weak, unthrifty and debilitated. If your dog has the above symptoms no time should be lost in treating it with Dent's Vermifuge. This remedy should be administered four times a year, as keeping a dog free from worms goes a long way toward insuring good health.

Distemper

After worms, the next disease to be suspected is distemper. This is a contagious disorder and most dogs have it at some time during their lives, generally at an age between four months and one year, or at about the

time they are cutting their teeth. If your dog has never had distemper and is at the age when dogs usually have it, if it has been at any of the dog shows, or associating with dogs that have, you can confirm or reject your suspicions by looking for some of the symptoms of distemper. The most notable are usually those of a common cold. At first the patient is dull and lifeless, avoids the light, loses its appetite, sneezes and snuffles and has a dry, husky cough. There is a watery or mucous discharge from the eyes and nose, the skin is hot, sometimes a rash appears, while the eyes are red and the tongue coated, the discharge from the nose and eyes thickens, the nostrils become glazed with a yellowish matter and the cough grows more severe. Later the bowels are irregular, passage fetid, and the stomach is unable to retain food, a yellowish matter being vomited. The eyelids are glued together, breathing is labored and the breath terribly offensive. The muscles twitch convulsively and finally the patient dies from exhaustion or with fits resembling epilepsy. In treating such cases, place the patient in a warm room and use every precaution against taking cold. Dent's Distemperine is a reliable remedy, and to derive the best results from its use, do not use any other medicine in connection with it. Keep the eyes and nostrils clean by frequent sponging. Be sure to keep the patient indoors until fully recovered.

Pneumonia

Dogs recovering from distemper and those exposed to

Pneumonia

draughts, cold winds or storms frequently come down with pneumonia. With this disease a dog, instead of lying down, sits on its haunches, with the forelegs braced so as to expand the chest (see illustration); the breathing is accelerated and labored, the membranes of the eyes dark red and congested, and upon applying the ear to the chest a dry crackling sound will be heard, that is similar to that made by walking on dry snow with clean boots. Treatment is the same as for Distemper.

Chorea

A very distressing disorder of the nervous system, known as chorea, frequently follows distemper. It is also one of the results of worms, and presents the following symptoms: Involuntary twitching of various muscles and limbs, as the face, legs, neck and shoulders. In some cases the twitching continues during sleep. In old cases there is little pain, but the muscular exertion soon wears out the animal. Dent's Chorea Medicine will cure many of these cases. It is also a good tonic.

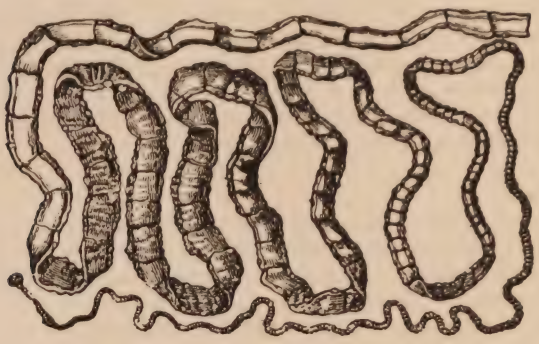
Fits

These come on suddenly and last from three to twenty minutes. They are ordinarily indicated by the following symptoms: A slight quivering of the muscles, anxious countenance, a few staggering steps, and the dog falls on its side, its body and limbs working violently. The face becomes distorted, with convulsive working of the jaws, and the mouth fills with ropy saliva. The patient generally recovers slowly and appears dazed, frightened, and attempts to hide. To cure a dog so affected, place it in a warm bath and if the patient has worms or indigestion, treat accordingly, and it may be stated at this time that dogs properly treated for worms seldom have fits.

Tapeworm

If your patient is an aged dog, has had distemper, and for no accountable cause is slowly going off in flesh, has foul breath, irregular bowels, and seems all out of sorts and run down, indigestion should be suspected, due either to poor food, a weakness of the stomach's digestive glands

or irritation set up by worms, possibly a tapeworm. If it is due to the latter cause, there will be passed in the



feces, joints of the worm that look like pieces of flat, white tape (see illustration). The patient should be treated with Dent's Tapeworm Expeller.

Indigestion

The animal is dull and lifeless, nose hot and dry, tongue coated, coat harsh, and staring eyes languid, appetite irregular, and frequently a disposition to eat all kinds of dirt and rubbish; the animal stretches out at full length and there is gagging and frequent attempts to vomit,

sometimes bringing up a frothy green liquid. To cure such cases first treat with Dent's Vermifuge; feed on easily digested food, such as meat broths or fresh milk

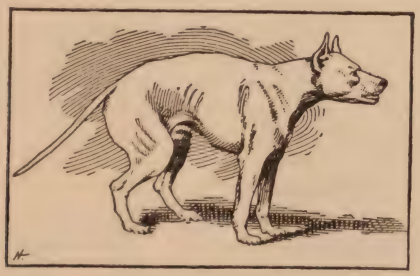
thickened with Spratt's Dog Cakes, stale bread or crackers, raw, lean beef, chopped fine, mixed with gelatine or egg. Give Dent's Condition Pills three times a day; they are a wonderful tonic for run-down dogs, and will build them up in a remarkably short space of time.

Diarrhea

Diarrhea is another common ailment which should not be neglected, as it is apt to get beyond control and seriously weaken the patient; it is caused by indigestion and colds and is a common complication of worms and distemper. In treating cases of this description, keep the patient warm and quiet. Give from ten to 40 grains of the sub-nitrate of bismuth on an empty stomach, feed toasted whole wheat flour and milk, raw eggs, beef broth and stale bread until the action of the bowels is regular.

Constipation

The condition of a dog's bowels must always be considered. Constipation is a common ailment of dogs, particularly of house pets. It is not in itself dangerous, but if neglected gives rise to other disorders, and a dog cannot be considered healthy unless its bowels move naturally once or twice a day. Lack of exercise, overfeeding, indigestion and too nutritious foods are the commonest



causes of constipation, and the symptoms usually noted are frequent attempts to evacuate, groaning, uneasiness, sliding along the floor, bad breath and scurfy skin. In most cases all that is required is a dose of Vermifuge.

Dogs that are fed on Spratts Dog Cakes seldom suffer with constipation. They should be made the regular diet of dogs whose passages are not regular.

EXTERNAL DISEASES

Mange

There are a number of diseases that a dog is subject to externally, and of these the commonest is mange. This disease usually results from contact with another dog or some other animal similarly affected, or is contracted by occupying a yard, kennel or shipping crate of an animal so afflicted; it resembles itch in man and is due to a small insect that burrows under the skin and occasions the most intolerable itching. The uneasiness and loss of sleep caused by the continued scratching and biting in an effort to allay the pain have a very debilitating effect upon the system and transform, in a comparatively short time, the healthy, sleek-coated pet into one of the most loathsome and pitiful of objects. The disease generally makes its appearance first at the root of the tail, the elbows, under the forelegs, on the chest, forehead, or base of the ears, and then spreads all over the body. To treat properly, the patient should be removed to clean quarters, all old bedding burned, and the kennel washed with boiling water and then whitewashed. Wash the dog in lukewarm water, use plenty of Dog Soap, so as to soften and break up the scabs and scales, then apply Dent's Mange Lotion to all affected parts, and in bad cases all over the body. Repeat this application every fifth day for three weeks, so as to be sure to destroy the insects, which hatch out from the eggs buried deeply in the skin.

Dandruff in Humans

For parasitic diseases of the human head Dent's Mange Lotion is marvelously effective. The principal cause of premature baldness is dandruff due to skin cocci that one or two applications will destroy. A continuation of the treatment will leave the scalp in a clean, healthy condition. This is the first step toward securing a luxuriant growth of hair, for healthy hair cannot be expected to grow from an unhealthy scalp. Therefore, if your scalp is

itchy or covered with dandruff and your hair is dry, thin and coming out rapidly, do not hesitate about using Dent's Mange Lotion. It is put up in round, brown bottles; it is oily in nature but not disagreeable to use.

Eczema

Eczema resembles mange, but is due to impure blood, lack of exercise, overfeeding, fleas, lice and local irritations. The belly, elbows, inside of the thighs and back of the forelegs are the parts first affected, and the hair sacs or follicles are principally the seat of the disease. These become inflamed, and when the animal affected is white the hair at the roots has a reddish, rusty look. If prompt means are not taken to check the disease, the inflammation runs on rapidly, the entire skin and subcutaneous tissues are involved and the hair drops out from the affected follicles; purulent matter now exudes and pustules form; these break open and the matter from them runs together and forms scabs that crack open and bleed, and the animal becomes an exceedingly pitiful and loathsome object and emits a very disagreeable odor. The treatment is the same as for mange.

Canker

An inflamed condition of the membrane lining the ear passage is known as Canker of the ear. It occasions great suffering, and is liable to terminate in total deafness. The principal causes are exposure, blows or other injuries, the spread of a skin disease, neglecting to keep the ears clean, accumulation of wax, and the use of coarse soaps. It is accompanied with restlessness, violent shaking of the head, rubbing the ear and side of the face with the paw, sometimes sliding along the ground on the ear, and cries of pain. Upon examination, the ear will be found swollen, hot, and very tender; small, bright red spots and ulcers appear on the flap and in the passage, and in most cases there is a foul-smelling, dark-brown discharge containing blood and pus. In treating carefully cleanse the ear with lukewarm water, then dry the ear with absorbent cotton or old linen rags. Inject Dent's Canker Lotion twice a day. The ear, after the first

cleansing, should not be washed more than is absolutely necessary to keep it clean.

Goiter

An affection very common among puppies and not unusual in old dogs is goiter, an enlargement of the thyroid glands located on each side of the windpipe about half way down to the chest. The cause of these enlargements is not known; some appear over night, others are slow about developing. Usually they are free from pain, soft and elastic to the touch; sometimes they are hot and painful and increase in size so rapidly as to interfere with breathing and suffocate the patient. They are always unsightly and dangerous and should always be given prompt treatment. By far the most successful remedy for this purpose is Dent's Goiter Remedy.

Eyes

If the eyes are red, swollen and running, with an accumulation of matter in the corners or a scum covering the eyeball, do not delay treatment, as small pustules are apt to form at the roots of the eyelashes. In such cases treat as follows: Bathe the eye with warm water and use 10 drops of the following eye lotion three times a day: Sulphate of Zinc 6 grains, water 2 oz.

Fleas and Lice

The greatest annoyance dogs and their owners have to contend with are fleas and lice, for no dog can be healthy or happy that is tormented by these pests and is continually scratching and biting at himself in his efforts at relief. One of the surest destroyers of fleas is Dent's Sic 'Em Powder. It is non-poisonous and, being put up in boxes with perforated tops, can be easily dusted into the dog's coat and bedding, thereby giving him prompt relief.

To apply the powder, place the animal upon a large sheet of strong paper. Thoroughly dust the powder into every portion of his coat. The fleas will fall upon the paper. Those that remain must be found with the comb. The paper on which the dog has been standing can then

be doubled up and thrown into the fire. This treatment should be repeated every three or four days until the fleas are destroyed.

Quassia Water

An infusion of quassia wood will destroy lice. Take two or three ounces of the chips and tie them up in a muslin bag. Suspend them in a pail of water, stirring occasionally. After two hours the infusion is ready for use. Apply it freely with plenty of soap and rinse off with clear water. Strong tobacco water, applied in the same manner, may be used with good results, although it is apt to make the animal sick. Whale oil, freely used, is also sure death to lice. This should be thoroughly washed out of the coat a few minutes after using on account of cleanliness. Mercurial preparations of all kinds are never to be used for this purpose, as bad results are always sure to follow. Neither can kerosene be recommended, for the same reason.

Lice

Comb the dog thoroughly with a fine comb, and get off most of them; then wash him with soap and water, and before he is dry rub him all over with a strong solution of common salt and water, to which a little saltpeter has been added, allowing the solution to dry on. It may be necessary to repeat this three or four times at intervals of about three days.—*Bub.*

BIRD DOG TRAINING

First Lessons

The most successful handlers today do no yard breaking until the young dog has been introduced to game. The first real lesson in breaking therefore, should be given in the field, and this lesson is a very simple one. It consists merely of permitting the young dog to do about as he pleases.

Possibly the young dog will not range when first cast off. He may trot along at his handler's heels or he may go away a few feet, sniff about and run back to his handler again. Everything is strange and he does not

like to leave his breaker. In such an event the breaker should walk along slowly without paying any attention to the dog. Above all things, he should not try to force the dog to range. The moment he attempts to do that the

dog becomes impressed with a fear of the things that he is only a little in doubt about. If left alone until accustomed to his surroundings, he would find there was nothing to hurt him, and then he would do a little running and then a little more, until finally he would come to love the work. But if the breaker insists on meddling with him a serious mistake will be made.

Field Work

The purpose of these first lessons is to make the young dog bold; to give him some idea of ranging for game, and finally to let him scent out and see birds. The dog will love this work once he has done it. The sight and smell of birds will increase his ardor, so that no matter if he should be cowed a little when the work of yard breaking begins, his spirits can be revived by the work in the field. Thus prepared for his yard breaking, whenever that has been severe enough to give the young dog

a setback, the work in the field that he has learned to love will always raise his spirits. The two, then, can be carried on profitably together. But the fact should be impressed upon the breaker that he must not be in too big

a hurry to begin the yard breaking. Give the young dog plenty of field work first. Let him romp and flush and chase and have a good time.—*Modern Breaking.*

Charge

Call your dog to you, place one hand on his back over the hindquarters, the other on the neck or shoulders, and gently but firmly force him to the ground, meanwhile repeating the word "charge." Of course, he will struggle some, and after you get him down will probably roll over on his back, but this should not cause discouragement. Repeat this operation two or three times a day, and after a few lessons the puppy will probably crouch a little when you place your hand on his shoulder, and day by day will go down a little easier, and soon will begin to crouch as soon as he hears the word, even if your hand is not on him, and finally will drop as soon as he hears the word.

After this has been accomplished you begin to pay attention to the position, which should be with the body straight out and the head between the front feet. We do not advocate this position emphatically, and it is often preferable to allow the puppy to assume a position that is comfortable and more or less peculiar to him. After he will drop at the word of command and when close to you, back away slowly and walk around him in gradually increasing circles, and if he moves take him back to where he moved from and make him drop, and perhaps give him a cuff with your hand. After he will keep down while you move all around, begin teaching him to charge while at a distance from you. At first call out "charge" when ten or twelve feet away; he will probably come in close to you before obeying, but make him return to where he was when the order was first given and stay down for two or three minutes. After being taught to drop promptly, gradually increase the distance until he will drop at command anywhere within the sound of your voice.

The next lesson is the most difficult, and that is to teach a puppy to stay at charge while you go out of sight. You can accomplish this best by making him lie down in the yard, while you walk away or hide behind a fence, and if he starts to move speak to him sharply.—*Modern Breaking.*

Heel

This is not a difficult lesson and can be as easily taught to an old dog as to a puppy; in fact, there is considerable danger of cowing puppies by enforcing this command at too early an age or being too strict with them.

In the first place a check cord should be put on the dog, and while out for a short walk, he may be pulled back to heel occasionally. Two or three short lessons will give him an idea of what is wanted. Then the breaker should take a stiff switch or whip in one hand while he holds the lead in the other. After the dog has been pulled back to heel he may be tapped lightly on the head whenever he is pulled back. After having been fairly well perfected in these lessons, a longer check cord may be used and the dog allowed to go the length of the line. Then he should be ordered to heel, sharply, and if necessary be given a sharp cut with the whip. This will tend to make the dog hurry to heel whenever he hears the order. When he becomes well up in this work the cord may be taken off and the dog taught to come to heel without the aid of the cord.—*Modern Breaking.*

Pointing

The dog must be assisted in the first instance to come upon a covey of birds in the most advantageous way possible. If the breaker has located a covey in a likely place, he can work his dog toward it, taking advantage of the wind and time of day to secure a point. The dog should be given a run before being taken to the birds, and if it is a nice, open field a long check cord may be attached to the dog's collar. All the breaker can do now is to try to get to the dog when he first makes game. Once he gets near him while pointing, little trouble will be experienced in making the dog staunch. In this, of course, there is some risk of making the dog a false pointer, but with that fault, serious as it is, it is not necessary to be very much concerned at present. What is particularly desired at this time is to get the dog in the way of pointing staunchly, and the main thing is to get to the pointing dog when he stops. If he appears to have the body scent of birds he should be held by the collar

a moment, stroked and spoken to gently. — *Modern Breaking.*

Backing

The simplest way to teach backing is to have the dog which is to be taught, range well back of another dog, and so soon as the other dog is on point allow the young dog to gallop toward him without saying a word. To speak is to disconcert the dog, and really encourage him not to back, but to go on. When he stops get to him by approaching from the front. Walk toward him slowly with uplifted hand and speak slowly and kindly to him. Once the breaker gets his hands on him and pushes him about a little, the dog is practically taught this accomplishment. If, however, he has had plenty of opportunities to back and still refuses, he must lead up behind the pointing dog. If he refuses to stop and goes on to join in the point, he should be jerked back and made to stand. After a few lessons of this kind he may be started on slowly toward the pointing dog until he will draw and stiffen to a point. Sometimes a dog gets the habit of

rushing in so thoroughly confirmed, that it will be necessary to make him charge behind the pointing dog. This, of course, should be well back and should be continued until the dog shows some interest in the point. Then the breaker should go to him, lift him gently to his feet and "draw" him on until he stiffens. Finally he will come to like to back and will point well behind.—*Modern Breaking.*

Gun-shyness

The principle for the breaker to bear in mind in breaking a dog of gun-shyness is to refrain from petting or attempting to encourage the dog or to soothe his feelings. These the dog must learn to control by his own observations and reasoning. Every time the breaker attempts to encourage the dog, he really discourages him, for he gives the dog the impression that there actually is something of which to be afraid. Whereas, if the breaker acts as if there is nothing of which to be afraid and pays no attention to the action of the dog, it is only a question

of time until the dog observes the composure of the breaker and realizes there is nothing to fear.

If the practice of accustoming puppies to loud noises, such as the banging of two pans or the discharge of a small pistol, be followed up from the time they are weaned, gun-shyness will be avoided.

Lead the dog afield day after day. A small boy can be employed for this purpose, whose duties will consist in simply following a couple of shooters. No attention must be paid to the gunshy patient other than leading him about where he can see the dogs working, and if possible become encouraged by scenting game. At first the boy should follow a hundred or a hundred and fifty yards in the rear of the hunters. After the dog will lead quietly at that distance, he may be brought closer and closer, until finally he will lead a few yards behind the shooters while they are busily engaged in shooting. In this way his timidity gradually passes away and the dog will follow the shooters without being confined by a lead. From that, he will in time range out a little and hunt on his own account, and should be encouraged to flush and chase to his heart's content, and develop a love for the sport that will completely stifle any fear of the gun. All this cannot be accomplished in one lesson, but if persisted in patiently the fear of the gun eventually will be overcome.

Retrieving

There are two methods of teaching a dog to retrieve, the force system and the natural system. The force system is fully described in "Modern Breaking," a book devoted solely to the development of hunting dogs. The amateur trainer will, however, find the natural system the safer and easier method to pursue in teaching his young dog, although in many cases a combination of both the force and natural system proves most successful.

In using the natural system a dog's lessons should begin at an early age, for by this method a dog's natural instincts to fetch and carry are taken advantage of and developed into a successful accomplishment. Most puppies have more or less of the retrieving instinct, as is evidenced by their fondness for picking up and carrying odds and ends about the house, kennel and yard. At the teething period this instinct is especially strong, as the gums are inflamed and sore and the youngsters get more or less relief from mouthing hard objects or having a soft object like an old glove drawn between their teeth, and these conditions can be made use of to advantage. Shake an old glove in front of a puppy and he will grab hold of it;

draw it through his teeth and throw it a few feet away, and it is more than likely he will pick it up and give it a shake or two and bring it to you, so that you will again draw it away from him and throw it out for him to fetch. Every time you throw the glove say "fetch." Repeat this operation about half a dozen times, but be sure to desist before the puppy gets tired of the play, for while this is a lesson, in the puppy's mind it is only play. The puppy will not understand the word "fetch" at first, but in time, from hearing it repeated so frequently, he will associate it with the act of bringing the glove to you.

For these early lessons a glove is the best object that can be used, as it is soft on the puppy's mouth and the scent of the hand naturally associates it in the puppy's mind with his master. After the puppy has become accustomed to the glove and has some idea of picking it up and carrying it, various articles should be used, as a soft ball or one of india rubber, or a roll of cloth. If this is not done he may interest himself only in the glove and pay no attention to other objects. Repeat these lessons several times each day, showing him the object and then throwing it a short distance away for him to fetch, until he thoroughly understands what is expected, then gradually increase the distance, always exercising great care that you do not attempt to force your pupil too fast or throw the object too far. These lessons are best given in a closed room and the pupil generally does best if worked alone, for outsiders or other dogs distract his attention. In some cases two puppies can be worked together, but there is always danger of them playing with each other and getting their minds off the retrieving. There is very little trouble in getting the dog to run to the object after you throw it, and he will generally pick it up, and so long as he will bring it to you of his own accord all is well, but if he will not do so you will have to persuade him to fetch it to you, and if your voice is not sufficient to accomplish this, try the effects of rewarding him with a tid-bit of boiled liver. In giving lessons this way the dog must not be too hungry, for if he is, after he receives the first reward it will drive all thoughts of fetching out of his mind and he will think only of the food and will watch the hand that gave him the morsel. Throw the glove or other object six or eight

feet away, and if he fetches it to you reward him with a morsel of meat or liver and pat him on the head to show your appreciation. Repeat this lesson several times and reward him as often as he brings you the object thrown of

his own accord, but if he fails to do so do not reward him. If he drops it before he reaches you, go to him and place it in his mouth, say "fetch" and walk him back to the place

where you stood and then reward him. The idea is to get him to understand that if he brings you the ball he will be rewarded. Do not keep him too long at these lessons at one time, but keep them up day after day and always give them in more or less of a spirit of playfulness; after he will retrieve reasonably prompt you can become more exacting about his always bringing the object to you and delivering it into your hand.

Up to this time the pupil has been allowed to run for the object as soon as it was thrown, and it is also presumed that these lessons have been continued over a period of four or five months and that meanwhile he has been taught to drop at command. After he has been faithfully drilled in retrieving without orders he can be taught to retrieve to order. This can be taught easily. Call your dog to you, order him to drop, and if necessary steady him by laying a hand lightly on his shoulder; then throw the ball or glove, keep him in position a moment, and say "fetch," waving him on with your hand. Practice this until he will lie perfectly still when you throw the ball and will not start after it until he hears the word "fetch," then practice him standing. You can elaborate on these lessons and make them more difficult by throwing the object into the grass or weeds, or tossing it over a fence. After he has progressed as far as this in his schooling a variety of objects should be introduced for him to retrieve, so that he will not become too much accustomed to one or two objects.

During all these preparatory lessons the puppy has relied upon his eyes to find the object and has not used his power of scent. This should be developed, and he must also be taught to rely upon his master and look to him for instruction as to the direction in which to search. As a first lesson leave the pupil in one room and hide the ball or glove it has been accustomed to retrieving in another room, then call in your dog, say "fetch" and pretend to look for the object yourself, hunting with him until it is found. Do not hide it in too difficult a place, and be sure he finds it before he gets tired of the search, and never forget to reward and praise him for his success. After he has become proficient in searching for objects that have been hidden about a room he can be worked out of doors.

Order him to drop behind a house or fence, or a patch of bushes, and then place the ball or glove in some place where it can be found easily, gradually hiding it in more difficult places. These lessons can be rehearsed further by hiding pieces of meat or liver about a room or yard, and then going with him and encouraging him to scent them out and find them; this will teach him to use his nose, and if the lessons are given on an empty stomach he will search industriously and in time becomes very expert.

Care of Cockers

Cockers get their full height at from seven to nine months old, and then begin to fill out in body, the head acquiring its permanent shape last. The long feathering on the ears, like a man's beard, does not reach perfection until maturity, say eighteen months old, and if the ears become frozen before this age the growth of "feather" will be stunted. Give the pup clean and wholesome food, lots of exercise in the open air, and a sweet bed of clean pine shavings. These points are necessary to obtain a handsome, healthy and clean dog.

Teaching Pups to Take to Water

If pups show a disinclination to take to water don't force them in. The best plan is to take them to a stream which you can wade through; walk through to the other side, and they will probably follow you at once; if they do not, walk straight away from the opposite side and go out of sight; they will come after making a little fuss about it. If you have not a suitable shallow stream, but are obliged to make use of a deep river for your purpose, get an attendant whom they do not know to hold your puppies while you go around by a bridge out of their sight, and come down opposite to them, and follow the instructions I have given above; but remember, many young dogs have at first a great fear of getting out of their depth all at once, but will freely dabble into a shallow stream; so it is best to lead them on by degrees. Once having got off their legs, and finding that it is an easy matter to swim, there will be no further trouble. Always choose warm weather for this work.

Tree Ruffed Grouse

To teach your pup to be an expert treer of ruffed grouse, take him out late in the afternoon (at the opening of the grouse season if possible), into thick underbrush where you know the grouse are. Let him flush them up into the trees, and it being thick underbrush or second growth, they will light close to him and attract his attention, when he will bark at them (or will very soon). Carefully shoot one or two over him and go home. Repeat this lesson quite a few times and he gets the impression they must be in a tree before being shot. After this is instilled into him, shooting them on the wing will not unsteady him.

Coon Dog Training

The training of a coon dog varies very little from the training of a fox hound or a rabbit dog. The essential thing for the trainer always to bear in mind is that he must arrange it so that instead of trailing close and giving the coon a chance to dodge about from place to place, he must get his dog into the way of going for the coon with a rush and keeping as close to him as possible. No matter how long the coon remains on the ground he must be kept moving as fast as possible.

Once the dog gets the notion of following the coon instead of the trail he will work properly. But to put that notion into his head he should be worked alone in much the same way that the fox hound or rabbit dog should be worked. When thrown in with an old coon dog before he has been taught alone, he is likely to get the habit of following another dog, relying on him rather than on himself.

When it is possible for him to do so, he should be permitted to chase a tame coon by sight. If he is held in leash while the tame coon is permitted to run away in full view, his attention will be directed to the coon instead of the trail, and when he is slipped there will be no occasion for him to follow the trail, for he will be able to go without this aid. After the dog has passed the point where he lost a view of the running coon, he will

seek the trail. But as a general aid he will have the coon's course fixed in his mind, and will have a red hot trail to follow.

The coon, of course, will run to his home or take to a tree. In any event, the hound has had an exciting first lesson which will make a lasting impression and serve to fix his hunting method for the future.

Beagle Training

In training the beagle the first idea to inculcate thoroughly is to have him follow the rabbit and avoid the habit of merely running trails. Therefore it is a good plan, when taking a beagle first to field, to encourage him to run the rabbit by sight. If the rabbit is put down in the open and the beagle allowed to go after him, he will not bother to nose the trail so long as he can keep the rabbit in view, and when he first loses sight of him, he will be certain to run on at top speed until he loses the trail.

What is desired at this time is to get the young hound in the way of sticking close to the rabbit, and to keep him from dwelling on the scent. Short, sharp runs while he is fresh are what is calculated to get him into the habit of going as he should go, and during these short runs, he will not be likely to fall into the bad habits that a tired or discouraged beagle picks up.

When a young beagle will follow well by sight and then pick up the trail and rush on after the rabbit without dwelling or pottering on the scent, he may be given a few lessons in starting a rabbit.

That is hard work for the handler, as it will be necessary for him to tramp from one likely spot to another in an effort to kick out a rabbit. The dog should not be directed at this time but permitted to run about as he pleases. However, he will be likely to follow the trainer and pick up some notion of the kind of places likely to hold the rabbits. Should a rabbit be started, the pupil may be put on the trail and permitted to follow it in his own way so long as he keeps going on the trail. When he is at a loss he should be taken up and worked so as to hit the trail in another place. If no success is had at this,

the dog should be taken up and away from the locality entirely.

Once the young beagle gets the idea of searching for rabbits instead of rabbit trails he will not waste time

pottering about on unlikely ground, but will hunt the likely places and enjoy starting the rabbit, picking up the hot trail and following it.

After a young hound has had some experience in the field and has learned how to search for a rabbit or to follow a trail, there still remains the danger that if he is put down with an older dog the superiority will be so apparent to the young hound that it will tend to make him lean on the older dog, rather than rely on himself. This tends to injure his independence, something that the trainer should always seek to develop. For that reason it is well to take him out the first few times with poorer dogs, for it makes him bolder and better if he is working with dogs he can beat.—*Hounds and Beagles.*

In the Field

Do not feed too much before starting out for a hunt. Look after your dog's feet after a day's hunt. Leave no burrs on over night. Feed at night after hunting. Don't allow them to fill themselves with water while hunting.

Feet

For sore feet: Wash in lukewarm water, adding a little salt. Anoint with tar ointment. To prevent sore feet: Bathe twice daily for a few days in a solution of ½-ounce tannin, and piece of alum size of a walnut dissolved in a pint of water. Old beef brine is also good.

Chicken-Killing Habit

Slap the dog with the chicken he has killed a few times and make him understand he has done wrong. Then pass the chicken's legs each side of the dog's neck and tie the feet together so that the chicken hangs under his chin. Leave it on him all day.

Doggy Don'ts

Don't believe that anything is good enough for a dog, or that a sick dog can cure himself by eating grass. Don't house a dog in a dirty, damp, draughty kennel or allow him to sleep on a wet bed. Don't believe the more a dog eats the better off he is. A light meal in the morning and a full meal at night are what he needs. Don't neglect to supply your dog with plenty of fresh, cold drinking water. Don't forget to exercise your dog

every day. Don't forget that Sic 'Em Powder will kill fleas and lice on dogs, cats and domestic pets, and is a household necessity in flea-infested sections. Don't neglect to treat puppies for worms when two months old, and every three months thereafter. Don't allow a dog that has had distemper to go out of doors until completely recovered. Don't forget to take your dog out of doors the first thing in the morning and the last thing at night.

TRAPPING

Trapping Season

All furs are best in winter, but trapping may be carried on to advantage from Nov. 1 to April 1. In the hot months furs are worthless.

Successful Trapping

First of all any trapper, to be a success, must understand the laws governing trapping in his state and know enough to observe them. If the law permits you to trap

before the fur is prime, don't do it. Wait until you can get full value for your furs, it won't be long to wait.

Although trapping is permitted in October in some sections, it is entirely too early to do any real trapping; except in the far North, fur is of little real value, but October is the ideal month to stroll along the streams making a mental note of the fur bearer's haunts, etc. October should be a busy month for trappers; and not having to do any real trapping they can spend their time to no better advantage than in getting ready for real work later.

Preparations

Before the season opens put your traps in the best possible working order; mend up the chains and stock up with steel traps of the proper sizes—Nos. 1, 1½, 2 and a few of No. 3's for fox. Excellent service is available in Nos. 115, 215, 91 and 91½. The 1 and 91 will hold muskrat and skunk. The 1½, 91½ and 115 should hold nearly any of the smaller fur bearers. You should always select your traps with care for they play a most important part in your success.

Get your stretchers ready and make a few more correctly shaped boards. They may be bought at moderate prices or nice ones my be made out of pine or poplar boards one-half inch thick.

Scent Baits

For the mink, in regard to scent, I think that bait prepared from trout is superior to any other. In the summer, when I have a mess of trout to dress, I take some heads, etc., and put them into a strong glass bottle in the sun and they will turn to an oil that gives a very good scent —one that will attract the mink better than any other I have ever used, and by using a small chub or sucker and a few drops of the scent you have a killing bait.

Muskrat

The most prolific, widely distributed and probably the most profitable of fur bearers is the common muskrat to be found in streams, ponds and marshes all over the country. Stream rats usually live in dens in the banks, having the entrance at the edge of, or entirely beneath

the water. Marsh and pond rats during the fall build cone-shaped houses of grass, roots, mud and rushes. The entrance is beneath the water.

Stream rats are much harder to locate than pond rats. There may be a great many rats along a certain creek or waterway, but so distributed that, to the unskilled eye, there will seem to be only a few. When corn fields border a stream they will come from up and down the stream to feed. However, as a rule they depend on the roots and tender plants within reach of the stream. The muskrat is mostly vegetarian and seldom goes far from its habitation.

In the fall muskrats move about very frequently gathering a winter's food supply and, owing to this fact, they may be caught in great numbers at this season of the year. However, the pelt of the muskrat is not fully prime until February.

In looking up your muskrat sets it is well to note good places for winter sets. There are certain places along the stream where the water does not freeze, and if you know these places, excellent sets may be made after the ice forms. Where the water is swift is a nice place to look around.

On streams where the rats burrow back in the banks the trap should be set in the entrance of the den which is usually about one foot under water. It should be fastened with a stake, set as far out in the water as the chain will reach. When the trap is fastened this way the animal will drown itself after it is caught. The water where the stake is driven should be at least a foot deep. If the bed of the stream is so stony that a stake cannot be driven, tie a ten or twelve-pound stone securely to the end of the chain, and lay it out in the water. If the water is deep, the trap may be held by a straight slender stick at an angle of about forty-five degrees. When the muskrat is caught it will plunge into the water, the chain will slide down on the stake, and the muskrat, unable to draw it back, is sure to drown quickly. If not drowned, the captured animal is likely to escape.

Other places that are often better than dens are the little trails leading up the bank from the water. The traps should be placed under three inches of water at

the foot of paths showing frequent travel and fastened as above. No covering is needed on the trap.

Successful sets may be made in runways; on logs running from the bank into the water; on rocks above the water; and at the entrance to their houses and many other places. They are easily caught when trapped in their runways along feeding grounds or upon logs protruding into the water. A hatchet should be used to chop a bed for the trap in such a set. Always fasten the chain so the animal may be drowned.

Where the muskrat lives in marshes, it makes trails through the rushes and grass and can be caught by setting traps in these paths. If they live in houses they can be trapped, after ice forms, by cutting a hole into the house and setting the trap inside, fastening with a stake set up on the outside of the house. The hole that is cut in the house should be tightly closed after the trap is set. Avoid injuring or destroying the house, as this is unlawful in some states, and all trappers consider it unsportsmanlike.

Sometimes no good signs can be found where traps may be set, and in such cases traps may be placed at the bottom of a bank under three inches of water, and a piece of sweet apple, parsnip or pumpkin placed on a stick about a foot above the trap. All traps should be set in a way that will insure the animal drowning after capture.

The trap most used for muskrats is the No. 1 Victor, although the No. 1½ is preferred by some trappers. We especially recommend the double-jawed traps—the Nos. 81 and 91½ Newhouse and 91 Jump.

Skunk

The skunk is perhaps the most profitable of the fur bearers with the possible exception of the muskrat. They spend a great deal of their time in open cultivated field looking for food. They usually make their home in a hole along some gravelly hillside and, once located, are easily caught. They are also found around old barns, stone walls, hay stacks and such places.

In going over your territory in the fall, it is well to carefully examine the hilly sections. Skunks seldom dig a den, but inhabit the deserted den of some other animal.

You will find a good many dens in rocky bluffs and around old fields back from the highways, and the first thing to do when you locate such a den is to make sure if it is occupied. If there is a beaten trail going to the den do not interfere just yet. It may be the home of a fox or some other sly animal. Although the skunk is the most stupid of the fur bearers, do not content yourself with simply placing a trap in his path and leaving it there. When you make a set, do it with care and try not to disturb anything more than is necessary. A mink, coon or fox may come along.

If you can find the den of a family of skunks, dig out a place to receive the trap in the entrance of the hole; set the trap in place and cover lightly with dead grass or other light material. Draw the chain out straight, away from the hole, and fasten it with a stake. Some trappers prefer to fasten to the thick end of a bush but it allows the skunk to get partly in the den with the trap, and there he has a good chance to escape. It is better to use a stake, and visit the trap early in the morning to prevent the catch escaping.

Where you see skunk tracks or other signs and cannot find their homes, make baited sets. Place the traps between tree roots, in the ends of hollow logs, in little enclosures made of sticks, bark or rotten wood, at opening in stone piles and stone walls, or in front of holes in the bank. Cut a stout brush and fasten the chain to the butt. Cover the trap lightly. For bait use rabbit, fowl, muskrat, or the flesh of the skunk itself. Tainted, evil smelling bait is better than fresh bait for skunks. After you catch one of the animals and he discharges his perfume about the trap, others will be attracted to the place by the odor.

The No. 1½ Victor trap is probably the best size for this animal but the No. 1 is used extensively and generally considered strong enough. The special traps with the double or webbed jaws are also recommended.

Racoon

These cunning animals are allied to the bear family and also have much of the slyness of the fox and its cunning tread, but unlike them is more or less a water-loving

animal, which the fox is not. The coon may be trapped in very much the same way that mink are trapped. They are curious over any shining substance in the water and, when a piece of tin or a metal fish is placed upon the pan of a trap, the coon is sure to get curious and feel for the bright thing and be caught.

Take a short log and place in shallow water so one end is high and the other submerged. Several traps should be placed about the log and a good lure sprinkled on the log. When caught by one trap the coon, in his efforts to get away, is caught in the others and held fast until taken out.

Good sets can also be made in their runways in and out of corn fields and at the mouth of small streams. A coon is unusually strong and will test the power of a trap as will no other animal of equal size.

Opossum

These night ramblers are numerous in the South and are easily caught. They feed on berries and fruits, persimmons being their favorite diet. They den in a hollow tree, log or stump as a rule and sometimes den in burrows under the banks of ditches.

The best and surest way to trap opossum is at the den or under persimmon trees where they are accustomed to feed. When trails visiting a stream or pool of water are found they may be trapped with a certain chance of catching.

Mink

The mink is famous because of its sensitive nose and keen wits. He is a rambler, following the banks of streams and ponds in hunt of food. In fact they seldom travel very far from water and invariably travel the same route over and over again. They are hard to trail in winter while the ground is frozen, and in such cases should be trapped along the edges of the water. They continue to use their old places of going in and out of the water. It is therefore important that these places be located early as they are hard to find after the ground is frozen.

It is possible to locate goods sets by the sight of their tracks along logs running into the water from the bank.

Here you may find foot prints as on cold nights the wet print of the foot will freeze.

It is a good plan to set traps at such places along the stream, and another excellent set may be made where the bank of the stream is steep. Here, stick up a little row of sticks about six inches from the bank and at the end of the little fence toward the center of the stream place a No. 1½ Victor.

Go along the stream about the first of November, and look for mink tracks in the mud near the water. When you find tracks, set your trap at the nearest place where conditions are favorable, that is, where you find a steep bank a foot or more high at the edge of the stream. With a flat stick or an iron made for the purpose, dig a hole straight into the bank at the level of the water, three inches in diameter and ten inches deep. With a small stick fasten a piece of freshly killed fowl, rabbit, muskrat, bird or fish in the back of the excavation, and set the trap under two inches of water just outside of the entrance.

Stretch the chain out into deep water and fasten it by driving a crotched stake down through the ring, until the stake is several inches under the water and the trap held securely. Cover the trap with a few water-soaked leaves held in place by a pinch of mud.

You should step into the water some distance from where you want to set the trap and wade up to the spot. Stand in the water while making the set and do not touch the bank more than is absolutely necessary. When looking at the traps, walk on the other side of the stream and if it is necessary to go up close, do so by wading. In this way you will avoid leaving scent or signs of your presence near the trap, and the mink will not be afraid.

This set is very good as long as the water does not freeze, providing the mink in that locality can be lured with bait. In some districts mink get plenty of food and seldom go into baited traps. After ice commences to form on quiet parts of the stream, find a tile ditch which empties into the stream and set the trap at the mouth of the tile under water, placing a bait back in the tile. The water will not freeze there until the weather is quite cold.

Other very good winter sets can be made in hollow logs on the banks of the streams. Cut a little tree about an inch thick and fasten the trap chain to the butt. Set the trap in the end of the log where it is protected from rain and snow and cover with dry rotten wood (powdered), or whatever is found in the log. Place bait in the log beyond the trap. If the bait is fowl or bird, scatter some of the feathers over and around the trap.

The best way to catch mink that have grown wary is by setting traps in narrow places along the bank where the animal cannot pass without running over the trap. Such places may be found where logs span the streams, or where stumps and trees partly close the path. Under an overhanging bank is always a good place to set a trap. If the passage between the bank and the water is too wide, it can be narrowed with sticks and brush, but be careful that you do not give the obstruction an artificial appearance. Have the traps well cleaned and cover carefully with some light, dry material in keeping with the surroundings. Do not use any bait on this set.

Around driftwood and other debris along the streams, runways may be found where a catch or two is almost certain. Mink almost always travel near the edge of the water, and if there is a stump, log or stone half in the water they are sure to go in the water around it in preference to climbing the bank.

A good mink set has always been where small streams flow into the main stream. They are particularly fond of wading around in such places while exploring and hunting their food. A trap set at the mouth of these branches, up near the bank, is almost sure to make a catch.

When the banks of a stream are low and flat, place a log at right angles to the water, slightly raised at one end to form a guide for the mink. Place a trap in the water where the mink will step in preference to climbing over the log, and you have an ideal set.

The No. 1 Victor trap is used mostly for trapping this animal, but many trappers prefer the No. 1½ Victor which is larger and stronger.

The Newhouse and Oneida Jump traps in Nos. 1 and

1½ are also good, and the double jaw patterns are especially recommended.

Otter Trapping

A narrow-necked peninsula in the bend of a creek or river is almost certain to be crossed by the narrow path of the otter, and a point of land extending out into a lake is a favorite romping place. Where the slide of the otter terminates at the edge of the water is the safest place for the new beginner to set his trap, provided that the slide shows that the animal always enters or leaves the water at the same place. If the water is shallow at the bank of the lake or stream, the trail often spreads out on approaching the water, showing that the otter enters the water at any one of half a dozen places. Such a spot is to be avoided.

Water Set

Get a Newhouse trap, No. 3 in size, go to the spot, either in a boat or by wading along in the edge of the water from a point on shore three or four rods distant from the otter's trail, having the trap opened ready for setting, and a strong stake well sharpened inserted in the ring of the trap chain. Now we are ready to set the trap without making any disturbance above water. Arrived at the spot, select the point where it appears that the otter will step when next he comes that way and in water about 6 inches deep, smooth the bottom to make a good place for the trap; place the trap so that the jaws will spread out on each side of the otter's line of approach, extend the chain full length up or down the stream, and, with a hatchet brought for the purpose, drive the stake firmly into the bottom, with the top of the stake driven below the surface of the water. Then if the top of the stake is bright in color like green timber, gather some mud from the bottom and smear over it. Now gently sift some mud in the water above the trap, until a very thin coat of soft mud hides any brightness of the trap from view. Wade back to where the stream was first entered, having been careful not to touch the bank, and the trap is set in the manner known as the "water-set."

Another good water set may sometimes be obtained in the center of the channel of a narrow stream, on shallow rapids. Two things must be carefully noted here. First, that the otter does not travel on the shore at this point, and, secondly, that a point be selected for the trap where the channel is narrow and the water shallow.

Land Set

This is much more difficult, yet if done properly is much the better set of the two. At some certain point on the otter's line of travel on the land, and commonly near the top of a bank down which he has a regular slide, is a spot selected by this strange animal for voiding excrement. He will travel for long distances to reach this spot rather than do so at any other place. Sometimes it is deposited all in one heap, and sometimes scattered over a space a rod or so in diameter. If it is not in one pile, the trapper, making as few steps as possible, must gather the dried accumulations and deposit them on the greatest heap already formed, and having a perfectly clean trap ready (some trappers prefer having the trap well-smoked with the smoke of dried grass), together with the stake for fastening, proceed to dig a hole in the ground with the blade of the hatchet, in front of the heap of excrement, and about a foot distant from the edge of it, on the side next to the otter's trail, using the fingers as little as possible to avoid leaving scent. Dig just deep and wide enough to hold the trap, and use all possible skill in covering the trap, to have just as little matter covering it as may be and have it well hidden, in order that the trap jaws be not hindered from gripping firmly when sprung, and to leave the general appearance of the ground the same as before the trap was set. Be careful also to set the trap so that the jaws lie open on each side of the otter's line of approach. Now drive the stake below the surface of the ground and cover it and the chain carefully. The job is now complete, and the trapper—who, of course, will have been careful not to blow his nose or spit tobacco juice near the trap—walks carefully away, and on afterward coming to visit it once in two or three days will only approach near enough to see that the trap is all right, standing a very good chance

of making the acquaintance of the sleek brown creature with the much coveted overcoat, provided his work has been well done.

Fox

The cunning of the fox will test the skill of the most experienced trapper. They seem to have almost human intelligence, and consequently the utmost care is necessary in making sets for them.

The fox is very difficult to locate, they range in no particular locality, but usually select a rough place well back from the highways on ridges or thick hillsides. Where they have not been hunted or trapped hard they will steal out from their isolated dens in late afternoon and prowl about until morning, that distinct "yap—yap—yap" may be heard all about, but their dens may be miles away. They may be trapped in old cow paths or other woods trails, but in order to make a success in trapping them, it is necessary to get a range on their main hunting grounds.

Fox, like all wild animals, have a certain weakness which, if understood, is a big advantage in favor of the trapper. They are sure to climb to the highest point to watch any strange object. Therefore, do not set traps around bait but at a distance from it. If there is a knoll, the fox will go to it to get a better view of the bait. Set your traps on such places. A stump or log is a good place to set a trap in this case. He will go to the highest point and sniff the wind. Here he will be caught.

The fox is extremely wary and his faculties so keen that it may be truly said that success at fox trapping rests in the ability to make a set so carefully that nothing is left to cause suspicion.

Where fox use old roads or cow paths, good places will be found to set traps. They try to avoid wet feet, and for this reason a log spanning a stream is a good place to set a trap. Not only are you apt to catch fox, but coon, opossum, mink and other animals will use such places.

Fox Set

Take a common field mouse's skin and stuff it. Set your trap near a sack of grain, or at any place where a

fox is likely to pass. Cover the trap lightly and sprinkle some of the mouse chaff round it. Place the stuffed mouse on the pan of the trap so that it can be plainly seen. As the fox is attracted by the scent he will see the mouse and will not hesitate an instant, but will pounce both forefeet on the mouse without the least suspicion of a trap. It requires a strong trap to hold him this way.

Fox Trap

Select some warm springy place on a sidehill, or a boggy place that does not freeze up, and at the point where it is the wettest get some small pieces of turf about the size of the hand to serve as "steps," and beginning at one side of the wet place at regular intervals of about 12 inches fix them so that they will be strong and dry until you reach the springy or wet place where you wish to set the trap. Then skip one piece, and continue the line of steps until you get to dry ground on the other side. A narrow place that will require only three or four steps on each side of the trap is sufficient. Then cut a strong thin piece of turf of the same size and appearance as the others to place over the pan of the trap. For scent go to some chicken house and get some very fine dry manure (it must be very fine and dry), and put it in a coarse cloth or bag. Then when the ground is dry, drag the bag about a quarter of a mile each way from the springy hole, where you have placed the turf steps. If the bag is coarse and the ground dry, you leave enough scent for every purpose, as the rains will not wash it away, but improve it. Then go to a granary or some place where mice abound, and get some of the mice chaff usually found around such places, which generally smells very strong of mice. Then set the trap in the water, and placing the last piece of turf over the pan the line of steps is complete. Then where you have stood sprinkle a little chaff and pass on, not retracing the steps; and as sure as a fox strikes the trail he will follow it up, and when he comes to the spring (a fox is very careful about stepping in the water) will try the steps, and as the first and second are all right, and hold him, and as they are placed about the right distance

apart for his gait, he is pretty sure to step his whole weight on the one concealing the trap.

Home-Made Traps

Although the majority of vermin and other creatures are captured by means of steel traps, there are several

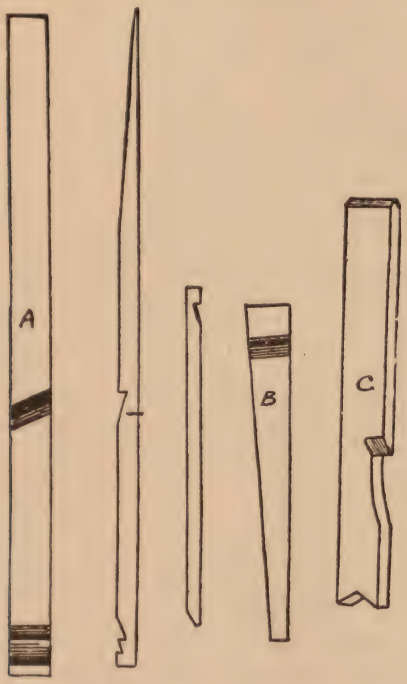


Fig. 1.

simple devices which can be made at home, and which prove very effective for taking birds and animals. Most of them require for their manufacture no tools other than a pocket knife and an axe. An advantage of home-made traps is that should they be discovered and stolen by trespassers and other undesirables, their loss is no

drain on one's exchequer, as they can be renewed at the cost of a trifle of labor only.

In Fig. 1 is shown the various parts of the Figure of Four trap. This is probably well known to most of our readers, and is a useful trap for killing anything from weasels to poaching cats. The piece A is 13 in. long, the space between notches being 4½ in. It is ½ in. wide and ⅜ in. thick. The notches are about 1-16 in. deep. The piece B is 6½ in. long, 1 in. wide at the notched end, and ⅜ in. at the other. Its thickness is ⅜ in. The notch is cut from ½ in. to 1 in. from the end, according to the weight of the stone or flag which the several pieces support. A heavy weight requires a short notch. The piece C is 7 in. long, being 3 in. from the foot of the notch, 1 in. wide, and ¼ in. thick. To set the trap, secure a flag or flat stone about 18 in. square—a weighted board will do equally well—and place a small piece of flat stone about the place where the outside edge of the weight will rest. This piece of stone supports the forked end of piece C and prevents it from being driven into the ground by the weight of the slate. Next place the notch in piece B on the top of piece C, so that the end beyond the notch in B is only just beneath the edge of the slate when the latter is propped up on it. Then place the point of piece B into one of the notches in piece A, and bring up the other sloping notch in piece A until it holds against the sharp notch in piece C.

The bait is tied on the end of the stretcher A, and should consist of something soft, as a hard bait may prevent the slate from crushing a small animal like a weasel when it falls. This trap may be made in larger sizes with heavy flags to take almost any predaceous creature. A heavy log may be used for the falling piece, and if a row of stakes are planted on each side of it to form a passage, it acts quite as well as a slate. Logs are easily procured on the spot in the woods, whereas stones or slates suitable for the purpose have generally to be carried to the place where it is proposed to set the trap.

Fig. 2 is a trap, or perhaps we might better call it a spring, which we were first shown by an Indian in Canada. The diagram practically explains itself. The

wooden slot is tied to the bow or springing piece with cord, and a length of fine string or strong thread is fastened to the end of the bow. The latter consists of a springy sapling planted firmly in the ground. The sapling is then bent over, and the string—having a running noose at the loose end—is passed through the slot, and held

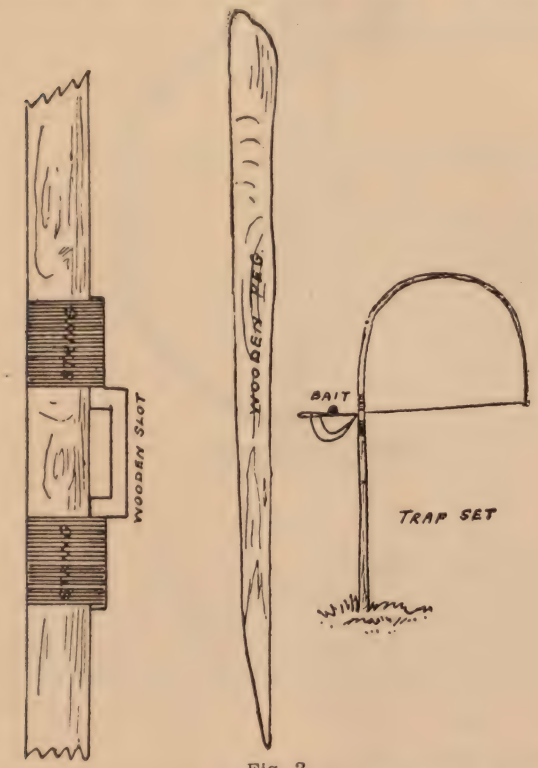


Fig. 2.

there by a peg which fits the slot fairly tight. The peg forms a perch to which the bait is attached, the running noose being laid over the peg. A bird settling on the perch at once displaces it, the bow flies up, and the noose

holds the captive firmly. Instead of using the slot, a hole may be bored through the bow, but when used in small sizes this is apt to weaken the springer.

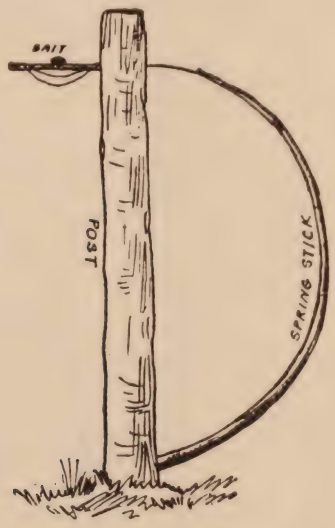


Fig. 3.

A variation of Fig. 2 is shown in Fig. 3. The springing piece or bow is fitted into an augur hole in a stout post, and a smaller hole is bored near the top of the post to accommodate the perch and string. Used the reverse way, with the butt of the springer near the top of the post, and with wire instead of string, a snare can be set to take ground vermin.

Skinning Small Fur

With the exception of coon, small fur bearers should be skinned whole, by cutting around both hind legs below the knee and straight across and around vent. The pelt is then removed mainly by "peeling" the hide from the legs with thumb and fingers. The tail should be split

down, say, two inches and the bone pulled out. The hide is then drawn down until forelegs are reached, where the knife is used to cut around the feet. More pulling and the pelt is worked down to the ears, and then to the eyes. Cut close to the skull so ear and eye holes will be as small as possible. When the nose is reached this should be cut off, leaving the gristle end of nose on hide. The pelt will now be flesh side out and should be placed on a stretcher made same shape as hide. Tails of opossum and muskrat should be cut off.

Stretchers

A very common mode of stretching skins consists in tacking them to a board, with the fur inwards, and allowing them to dry as already described.

This method does very well for small skins, but for general purposes the "stretchers" are the only means by which a pelt may be properly cured and prepared.

The board stretcher is the simplest form and is in most common use among trappers for smaller animals. The plain stretcher consists of a piece of board a quarter of an inch in thickness, about eighteen inches long and six inches in width. One end of this board is rounded off, and the sides should also be whittled and smoothed to a blunt edge and shaped somewhat to that of the pelt.

The board stretchers are used only for those skins which are taken off whole. The skin should be drawn tightly over the end of the board, and its edges caught in notches cut in the edges of the square end or secured by a few tacks. This stretcher is particularly adapted to the skins of muskrats, mink and animals of a like size. They are know in New England as "shingle stretcher," and are much to be recommended on account of their lightness and the ease with which they can be made and carried.

Care of Pelts

Large quantities of valuable skins are sent to market annually by inexperienced amateur trappers, and in many cases rare and beautiful furs have been almost spoiled by want of care in skinning and curing. The rules are simple and easily followed, a little care being all that is necessary to insure most perfect success. In every

case the skin should be removed shortly after death, or at least before it has become tainted with decay. Great pains should be taken in skinning. Avoid the adherence of flesh or fat to the skin, and guard against cutting through the hide, as a pierced skin is much injured in value. The parts about the eyes, legs and ears should be carefully removed. In all cases the furs should be allowed to dry in a cool, airy place, free from the rays of the sun or the heat of a fire, and protected from rain.

Astringent preparation of various kinds are used by many trappers, but they are by no means necessary. The most common dressing consists of equal parts of rock salt and alum, dissolved in water. Into this a sufficient amount of coarse flour or wheat bran is stirred to give the mixture the consistency of batter, after which it is spread thickly over the skin and allowed to dry.

It is afterwards scraped off, and in some cases a second application is made. This preparation is much used in dressing beaver, otter, mink and muskrat skins, but as many of our most successful and experienced trappers do without it, we fail to see the advantage of using it, as it is only an extra trouble.

The simplest and surest way is to stretch the skin and to submit it to a gradual process of natural drying, without any artificial heat or application of astringents to hasten the results.

Curing Skins

The following methods of curing small skins give complete satisfaction: As a preliminary to curing, the skins must first be dressed. To do this, stretch and fix them on boards by means of a few nails or tacks, and after scraping off all fat and flesh adhering to them with a blunt knife, rub them thoroughly on the inside with salt and a little saltpetre. When thoroughly dry and stiff, which condition they will quickly attain, if exposed to the sun or heat of any kind, they may be stored for as long as may be desired. Skins may be cured for home use in the following simple manner after having been first treated as described above: With a mixture of one teaspoonful of alum and a tablespoonful of salt in a

pint of water, wet the skin on the leather side at intervals of a few hours until thoroughly soaked, after which give the skin a good rasping with a blunt knife, and dry in the air. Then rub a little fat into it by the fire. Another process is as follows: After scraping the skin and removing the fatty matter from the inside, soak in warm water for several hours. Next, mix equal parts of borax, saltpetre, and sulphate of soda in the proportion of about ½ oz. of each, with sufficient water to make a thin paste; spread this with a brush over the inside of the skin, applying more on the thicker parts than the thinner; double the skin together, flesh side and put in a cool place. After standing twenty-four hours, wash the skin, clean, and apply in the same manner as before, a mixture of 1 oz. washing soda, ½ oz. borax, and 2 oz. hard, white soap, melted slowly together without being allowed to boil, fold together and put away in a warm place for twenty-four hours. After this dissolve 4 oz. alum, 8 oz. salt, and 2 oz. saleratus in sufficient rain water, and when cool enough not to scald the hands, rub this well into the skin, hang up to dry, and repeat the operation several times till the skin is sufficiently soft. Lastly, smooth the inside with fine sandpaper and pumice stone.

FISH AND FISHING

Where to Fish

Remember that fish dwell chiefly in those parts of the stream where the natural current carries the surface food, and that the largest fish select and occupy the best places. In lakes and ponds fish prefer spots where the coldest water is supplied by bottom springs or brooks emptying into the larger body of water.

Fishing Weather

Fish are most wary and difficult to capture on still days when the sky is cloudless and as a rule are sluggish on cold, raw, blustery days, which are usually accompanied by north or east winds, and they will not bite after a storm or flood, because these events wash plenty of food into the water and they are well supplied.

The Moon in Fishing

Fish are said to bite best between the new moon and the first quarter or between the last quarter and the "change."

Game Fish Ways

These articles are given to show the angler who has never made a deep study of the Trout and Bass, the cause and effect of certain natural economic facts in regard to their habits and the relation these habits have to the angler's ability to catch them.

Trout in the early spring months are at their best as far as gameness and impulse to rise to fly or to take bait, live or artificial, is concerned. Why is this? Food. In the spring the trout live on the aquatic larva of different insects such as hellgrammites, hairy caterpillars, etc., which have three stages of life, larval or "creeper," dormant or "pupa" and lastly change to the flying state, such as the dragonfly, etc. This food is of a nature to build up the fish, and as the snow water is still in the stream, the combination of strong food and cold water make the

gamey fighting trout of the early spring. They will be found to strike oftener in the spring at all hours of the day than at any other time of the year. Anglers know this but are perhaps not acquainted with the reason.

During the hot summer months when the larvae have developed into the flying insects they are not so readily caught nor in such abundance on the stream.

This is due to the fact that trout-stream insects hatch during the cool hours of the day, which are usually from about an hour after sunset, throughout the night, to an hour before sunrise. Inasmuch as the streams are normally low during the summer, their temperature is relatively high due to the action of the sun, and the trout are sluggish, retiring from the runways and riffles to lie inactive in the deep pools throughout the day. When the evening hatch of drakes, shads, etc., arises the trout resume their places in the shallow water and commence feeding. They then may be taken readily by means of the floating fly.

These conditions may be said to obtain during July, August and the latter part of September. Insects then gradually diminish in number and variety, due to the approaching autumnal season, and the food of the trout again becomes mid-water nymphs and larvae, minnows, fresh water shrimps and bottom food, such as worms and mollusks.

Scientific experiments have shown that the flesh of trout which feed exclusively upon bottom food is a deep pink or light red in color, while the flesh of trout which feed entirely upon surface insects is of a color ranging from light cream to almost pure white.

Where to Fish for Trout

Where to fish for trout in rivers. This refers to the big water trout, not to those in the small brook where the fish are small, but in the waters where you cast from the shore.

First examine your stream carefully as to current, flow and depth. In the average stream you will find the riffle or little rapids. Fish just below these, at the junction of any small rivulet entering the parent stream, cast across the flow, around any rock or stump in the river where

there is a play of current, at the sharp bend of the stream where the current swings away from the bank, or in the eddy of a whirlpool made by a hollow in the bank. In the early spring the larger fish will be in the swiftest water; in the summer he will be in the deep pools under the cool of the overhanging bank, under a windfall above the water or any other sheltered spot in the stream. The lake trout will be found in the early spring at the surface and can be caught there; in the summer he is at the extreme depth of the lake.

In river fishing do not be deceived in thinking the trout is in the centre of the pools, for he is not there but in the bubly water at the edges of that pool, and only suckers and chub are in the middle. River trout do not lie at the surface as many believe. They are invariably at or near the bottom, darting up to take the bait in almost straight line and rushing with their mouth toward the current.

Brook Trout

Never when fishing a stream allow your shadow to proceed you or in any way let your presence be heralded to the fish. Either go down stream and whip up if the sun is in the wrong position, or the reverse. The true sportsman is fair to his fish, gives it a fighting chance. Also remember that fish is food; take what you require and no more.

There are two ways to fish a stream—to cast and to trail your fly. The first is to cast into the quiet pool or the still water of the overhanging bank, where the current is slack. More strikes are made on the outgoing cast than on the reeling in, for the trout rising turns to take the fly quicker on the slack line than on the fully stretched one. The trailing method is simply allowing the bait to float with the current in the straight flow. In swift water where there is an obstruction in the rapid, cast over to the quieter water beyond and let your line float down and across the current, meanwhile letting more line out.

Lake Trout

Lake trout are taken on the troll with a live or artificial minnow. In the spring and fall troll with a medium length line at the surface; in the summer, when the fish are in the depths, it is necessary to go deeper, a heavily

leaded line or a braided copper one of from 150 to 200 feet being used for that purpose. The copper line is the better as it sinks of its own weight and gives the angler more play. In spring and fall fishing of lakes work around rocky shores, between narrows, over sunken ledges, etc. In summer trolling in a wide circle in the deepest part of the lake.

Leaping Fish

On the leaping game fish of the northern country little has been printed, and it should be of great interest to the angler, for the leap is the one test of the true fisherman. Will the fish shed the hook or is the angler skillful enough to hold him? Our leaping fresh water fish are the salmon, bass, trout, maskalonge and sometimes the pike and pickerel.

The salmon is the real fish athlete; he takes a perfect bowlike curve, often two feet or more, and makes hardly a ripple when taking the water. The brook trout will also leap out of the water in taking the fly, but after being hooked will dash for deep water and make short, abrupt turns as he is reeled in.

Bass break as soon as the barb sets and gives a wicked shake of the head to dislodge the hook. I have seen bass leap nine times before they were in the net.

The mascalonge leaps like a bull at a gate with a fierceness that may tend to unnerve the novice. Naturally the reason for the leap is to eject the hook, for it is in a tender spot, and as he cannot free himself of the hook he tries to leap over it.

Mascalonge

The mascalonge is the most ferocious of fresh water fish and his range is smaller than the bass, being essentially a cold water fish. Mascalonge are plentiful in Canadian waters and in the northern states, especially Wisconsin and parts of New England. They are of the pike and pickerel family and are the largest of the species, reaching as high as 100 pounds. These fish are free biters; they are only found in weedy waters and are caught on weed beds or shoals. Trolling is the only satisfactory way to fish for "lunge," and the angler should have a reel capable of

holding 150 to 200 feet of line. Troll along the outer edge of the weed bed with about 50 feet of line out. When the fish has struck he will at once leap clear of the water and unless the fisherman is quick on the reel, will shake the bait. Take in the slack and let him always have a taut line; you will have to give line, but always keep it as taut as possible. The "lunge" has a habit after striking of swimming with the bait toward the boat for a distance, and the angler may think he has lost the fish, but if he reels in quickly the result will be another plunge out of the water and the fight will be on again. The angler should have both gaff and net for landing "lunge," as the smaller can be netted, but the larger require the gaff.

Pickerel

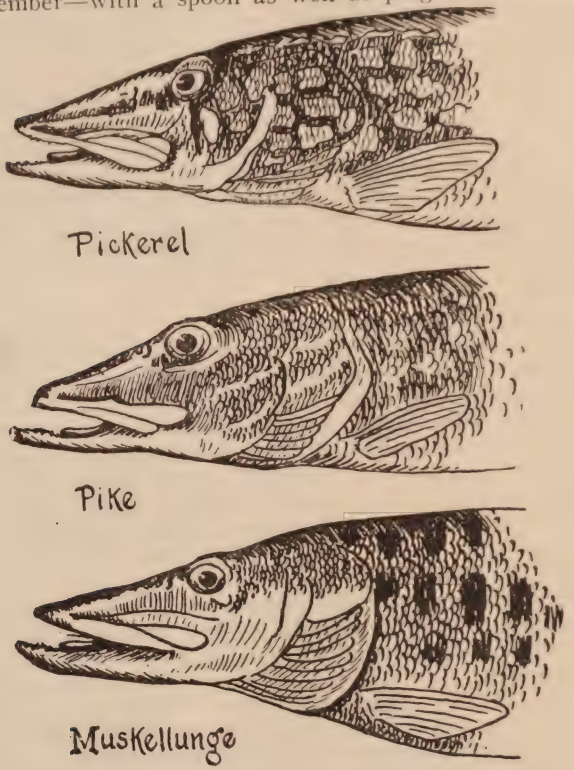
The pickerel is one of the fish you can find nearly anywhere, as he can pick up a living on next to nothing and at the same time raise a large family.

The pickerel is found in nearly all rivers, lakes and ponds; his preference being shallow, grassy lakes. His main hunting grounds are along the edge of lily and weed beds and on the outskirts of the weedy, grassy-looking growth called "pickerel grass." He is a real barbarian, preying on all smaller fishes—vicious to the core, and will often strike a trolling spoon hard enough to bend it double.

The best way of catching the pickerel is by trolling. It is best when trolling for him to use somewhat heavier tackle than that used for casting; a good outfit being a 5½-foot steel rod, a reel of 100 yards of fairly strong line—say 16-24 lb. test—and a lure, a No. 4 to 6 spoon with a flashy red and white feather treble hook attached. Keep the spinner shined, as pickerel love color.

Row about 10 or 15 feet out from where the weed bank slopes off to deep water, as this is the hunting ground of the pickerel. Let out from 75 to 100 feet of line—it is sufficient to keep the bait far enough from the boat to insure against his seeing it. Row from two to three miles an hour, thus keeping the spoon spinning evenly, yet allowing it to sink some six to eight feet under water. While the pickerel will come to the top, the most of his feeding is done in "middle water."

Keep the rod straight out behind the boat to lessen the strain that is necessarily brought to play upon it. Remember—with a spoon as well as plug it is necessary



Pickerel: Chain-markings-scaly cheek
Pike: Markings plainer-scaly cheek
Muskellunge: Spotted-darker-smooth cheek

to strike the fish the instant he hits your bait, as he will immediately throw it out, finding it unreal, unless he hooks himself.

Perch on the Fly

Yellow perch will take trout hackles of gay colors. Sink the stretcher fly 2 feet below the surface of the water by a buckshot sinker; then draw gradually toward you by several pulls. Use three flies and you will sometimes catch three perch at one cast.

Lake Trout Fishing

Anchor a buoy in deep water, and cut up small fish in pieces the size of a butternut. Scatter the pieces around the buoy for some days, then tie your boat's painter to the buoy, bait your hook with pieces of fish such as you have been feeding the trout with. Fish near the bottom and give your line short jerks. Don't bait the buoy the day you fish.

Lake Trout Trolling

Use silver or brass spoon hooks and a sinker weighing ¾lb. to 1 lb., so that the spoon will run near the bottom. Line should be 300 to 500 feet long. Draw and loosen the line occasionally while rowing the boat, and move quite slowly. Troll in very deep water in summer, shallower water in spring and fall.

Yellow or Striped Perch

Found in many waters, the yellow perch is in a class by himself as a sweet-meated little pan fish.

The natural home for the perch is any weedy spot in a lake or river; the ideal spot being a shallow bay or inlet with from eight to fifteen feet of water, with a good growth of weeds and occasional open spaces or pockets.

The perch will take an artificial plug or spoon, dotes on flies, loves worms, minnows, grubs, etc., and in general just can't get enough to eat.

His bite, when taking a live bait, is very much different and therefore easily distinguishable from any other fish. It is more of a ripple, or series of short, quick jerks, and when hooked he fights very much the same way

as he bites—with short, quivering runs, seeming to hold his head still and vibrate the rest of his body.

As stated before, as a pan fish he cannot be beaten when fried to a crisp, golden brown in plenty of butter or grease; and his numerous small bones properly removed, he is food fit for anyone, and on a par with his older cousin, the wall-eyed Pike, whose flaky, white meat is so well known to anglers.

Rock Bass

There is probably no small fish that can be found in so many different waters and so willing to attack bait, whether real or artificial, as the rock bass.

Known by a multitude of names ranging from Rockie to Goggle Eye—because of his big, red eyes—he is a feeder of the first water, and stands very high as a delicious pan fish when caught in good, cold, running water.

He is a lover of company—rarely being seen alone—preferring the companionship of numerous others of his kind. In still water he is more often found around underwater weed beds, stumps, etc.

Seldom growing in excess of three-quarters of a pound in weight, he is scrappy to the last scale on his somewhat homely body—often fooling even the knowing angler into thinking it a black bass on the bait end of his line.

Among the more familiar or common lures on which the rockie can be taken are live minnows; size being no obstacle. (The writer has caught rock bass on a six-inch perch bait while fishing for pickerel.) Upon worms and grubs he is an eager and voracious feeder, there seeming to be no end to his appetite. Grasshoppers and small frogs also fall prey to this sturdy little fellow's hunger.

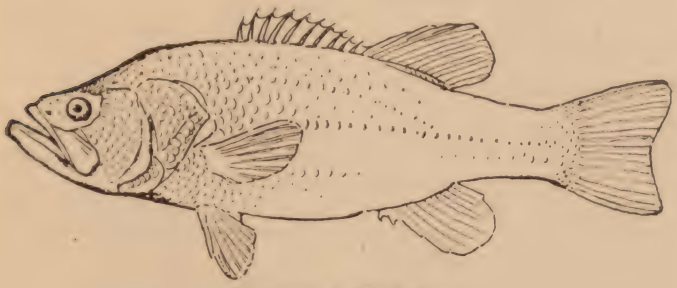
As for artificial lures, much sport can be had when the May flies are swarming the banks and falling on the water, by casting for him with nature lures. He is not as particular and choosing fish as the trout or bass; most any fly will serve to get him. He is also guilty of attacking the more husky and vicious-looking artificial plugs and trolling spoons.

All in all, though looked down upon by numerous

anglers after larger game fish, the rock bass has often been fallen back upon to fill an otherwise empty larder, and once eaten, properly prepared, his sweet, white, flaky meat immediately wins for him a new friend.

Carp Fishing

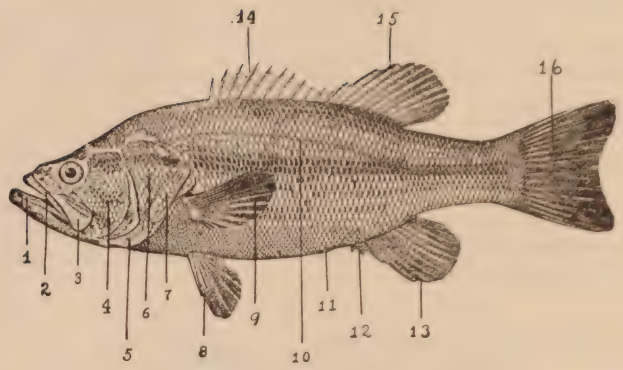
Feed the fish with boiled potatoes, boiled oats or oatmeal in the same spot for several days, then stop feeding for a day or two, after which fish for them with a small trout hook baited with angle-worms, or with the stuff you feed them wrapped in fine lace. Use a float, and sink the bait near the bottom.



Large-mouth Black Bass

Small-mouth Black Bass

Diagram showing the difference between the small- and large-mouth bass



Parts of Fish

Black bass (*Micropterus salmoides*): 1, mandible; 2, inter-maxilla; 3, maxilla; 4, pre-operculum; 5, inter-operculum; 6, operculum; 7, sub-operculum; 8, ventral; 9, pectoral; 10, lateral line; 11, vent; 12, pre-anal spines; 13, anal; 14, spinous dorsal; 15, soft dorsal; 16, caudal.

Black Bass, Large-Mouth and Small-Mouth

The large-mouth (*Micropterus salmoides*) is distinguished from the small-mouth (*M. dolomieu*) thus: In the large-mouth the upper jaw or maxilla extends far behind the eye; in the small-mouth the maxilla extends to a point below the eye. The large-mouth has from sixty-five to seventy rows of scales between the gill-openings and the base of the tail; the small-mouth seventy-two or more; the large-mouth about ten oblique rows on the cheek, the small-mouth seventeen; in the large-mouth are seven and a half to eight rows between the lateral line and the dorsal, in the small-mouth eleven.

The small-mouth black bass, together with his somewhat phlegmatic brother, the large-mouth black bass, probably occupies the attention of more anglers each season throughout the United States than can be claimed for any other species of fresh water game fish. The attention is

indeed well deserved, for the fighting qualities of the small-mouth at least, are excelled by few if any other fish, and the ability of both to exist and to thrive in close proximity to great centers of population in spite of incessant fishing, as well as in the unfished waters of the wilderness sections, is not only a tribute to its sagacity and hardiness, but makes it available to the humble fisherman as well as to the scientific angler.

Both varieties are found in the lakes, ponds and rivers of the United States and southern Canada, the vicinity of the Great Lakes and the Mississippi watershed being the sections where they seem to predominate. In fact, in that part of the country nine out of every ten anglers are bass fishermen.

The small-mouth shows a marked partiality for deep cold lakes and ponds, and clear unpolluted streams, preferring a rough or rocky bottom to a soft or muddy one, and does not thrive in shallow ponds, while the large-mouth does well in the latter, and some of the best fishing for large-mouth bass is to be found in shallow ponds with muddy bottoms and often choked with weeds.

The best places in lakes and ponds for small-mouth bass will be found over sunken ledges, where the bottom drops away abruptly; on sandy or pebbly spots on an otherwise rocky bottom, and particularly if these spots bear a growth of weeds; on sand bars where weeds are plentiful; on reefs running out from shore, and on sunken reefs wherever these appear near the surface. In rivers and streams, they will be found in the pools, and in the large pockets of the rifts, though at some seasons and some conditions of water, they will appear to be everywhere, and again, nowhere.

The large-mouth rather avoids the rapid waters, and will usually be found in the lakes and ponds, in and near weeds, cat-tails being a favorite hiding place. Large fish will often rush out from what seems an impenetrable thicket of weed roots and cat-tail stalks, snatch the bait and dash back again, in twelve or fifteen inches of water.

The small-mouth is a gamier fish than the large-mouth, though it does not attain so great a weight, running, in good water, from two to four pounds, while the large-mouth will weigh from three to five pounds.

Fly Fishing for Black Bass

It is useless to cast a fly for black bass on perfectly smooth water. Cast the flies as lightly as possible, causing them to settle as quietly as thistle-down. After casting, the flies should be skipped along the surface in slightly curving lines, or by zig-zag movements, occasionally allowing them to become submerged for several inches near likely-looking spots. If the current is swift, allow the flies to float naturally with it, at times when they can be skittered back again, or withdrawn for a new cast. Two or three times are enough to cast over any one spot, when a rise is not induced. When bass are biting eagerly or quickly, whipping the stream is to be practiced; that is, the casts are to be often and rapidly repeated, first to one side, then the other, allowing the flies to settle but a moment. In casting and manipulating the flies, the line must be ever taut; for often a bass will thus hook himself, which he never does with a slack line. It is best to fish down stream, even with the wind against one. Cast just below ripples and rapids, over eddies and pools, along the edges of weed patches, under projecting banks and shelving rocks, near submerged trees or driftwood, off gravelly shoals, isolated rocks and long points or spurs of land; it is useless to fish long, deep, still reaches of water. The most favorable time for fly-fishing for black bass is during the last hours of the day, from sundown until dark, and also on bright moonlight evenings. On streams, an hour or two following sunrise, in warm weather, is quite favorable. On dark, cloudy and cold days the middle hours are the best. Bright sunny days, especially in hot weather, are not favorable to fly-fishing, except in quite cool, shady and breezy situations.—*Henshall.*

"Striking" the Black Bass

The angler should strike by sight or by touch; that is, he should strike the moment he sees the rise; for the bass has either got the fly in his mouth, has missed it, or has already ejected it, when the rise is seen; it very seldom happens that the rise is seen before the fly is reached by the fish. The angler must also strike at the moment he feels the slightest touch or tug from the fish, for often the

bass takes the fly without any break at the surface, especially if the flies are beneath the surface. Striking is simply a twist of the wrist, or half turn of the rod, either upward or downward (upward with stiffish rods, and downward with very willowy ones), which is sufficient to set the hook if the rod and line maintain a proper state of tension; but when the careless angler has a slack line, and, consequently, a lifeless rod, he must necessarily strike by a long upward or side sweep of the rod, called "yanking;" and should he succeed in hooking the fish, the chances are that it will shake the hook out again before the slack can be reeled. The rod must always be held upward, so that it constantly maintains a curve with the line; and never under any circumstances must the rod point in the direction of the flies after they reach the water, for this allows the direct strain of the fish to come upon the line or leader.—*Henshall.*

"Playing" the Black Bass

When a bass is hooked he must be killed on the rod; the rod must stand the brunt of the contest; the more pliable and springy the rod, the less likelihood of its breaking, for a stiff rod is more pliable than a flexible one. Give the bass more line only when he takes it; make him fight for every inch, and take it back when you can; hold him by the spring of the rod, and do not hesitate to turn the butt toward him to keep him away from weeds, rocks, snags or other dangerous places; this will bring him up with a round turn, and is called "giving the butt." Don't be in a hurry to land him; the longer he resists the better for your sport; take your time, and only land him when he is completely exhausted; for if he is well hooked, and the proper tension of the rod and line maintained, he cannot get away; on the other hand, if he is tenderly hooked, the more gingerly he is handled the better. Therefore, never be in a hurry, and never attempt to force matters; always keep a bent rod and taut line; if the bass breaks water, the best plan is to lower the tip, so as to slack the line, and immediately raise the rod and tighten the line when he strikes the water again, for if he falls on the tightened line he is most sure to escape; this is one of his most wily tricks.—*Henshall.*

Black Bass Fishing With Minnow

Use minnow 4 or 5 inches long. Insert the hook in its upper lip and pull it out through the nostril or eye. Use a small braided silk line about 50 yards long and tie a small swivel and the smallest sinker 1½ feet from the hook. Reel up the line as far as possible, grasp the rod with the right hand just below the reel, put the thumb on the line to regulate it, make the cast and stop the line as soon as the minnow strikes the water. Small minnows may be hooked through the back near the dorsal fin. Don't strike until the bass has had the bait 6 or 8 seconds. Then pull gently, and if he jerks, let him go again; if you feel his weight firm and solid, give a strong pull. Keep the minnow about a foot from the bottom in still waters, and use a float if you wish. In rapid waters keep the minnow near the surface.

Black Bass Flies

1. Flies should be small rather than large. 2. On bright days and with clear or low water, flies should be quite small and of subdued dark or neutral tints. 3. For cloudy days and high, turbid or rough water, large and brighter flies should be used. 4. For very dark days or from sunset until dark or on moonlight evenings use gray or whitish flies of good size.—*Henshall.*

Black Bass Trolling

Use the smallest spoon you can buy, and tie two or three gaudy flies above it. Row about two miles an hour, use plenty of line and take a course along the edge of the sub-surface water plants, or where the bottom of the river or lake suddenly deepens.

Bass in Still Water

Use but one fly when fishing for bass in still water.

Black Bass in Pairs

Large black bass go in pairs all summer. If you catch one, look out for his mate.

Weight of Black Bass

Small fish weigh less in proportion to their length than larger ones. From some memoranda the following table

of relative lengths and weights of black bass has been prepared, the lengths being from nose to end of tail fin:

Length	*Weight* Lbs.	Oz.
8 inches		8
9 "		11
9½ "		15
10 "	1	2
10½ "	1	6
11 "	1	8
11½ "	1	12
12 "	2	
13 "	2	4
14 "	2	10
14½ "	3	2
15 "	3	8

Variation in Weight

It is well to keep in mind that the figures given in a table of weights and measures in relation to fish are subject to considerable variation.

The weight of a fish of any species of a given length is determined entirely by the condition of the water in which it lives and by its food supply. The latter is by far the most important factor.

For example, a brook trout of 14 ins. living in a lake and having an abundance of surface insects, mid-water larvae and bottom food may attain a weight of one and three-fourths pounds. On the other hand, a trout of the same length, living in a fast running, highly aerated stream, where the food is not over-abundant, has to fight the current constantly and works hard for its food. Consequently, the latter fish may weigh scarcely a pound, even though he be the same length as the trout that lives in the lake.

The same thing obtains with respect to bass and all other fish, though perhaps to a lesser degree.

It has been proved that there is a marked degree of individuality among fishes as well as among animals and people. It often happens that an angler takes two fish of the same length during the course of a day's sport. Though they be of the same species, one weighs several ounces more than the other. Inasmuch as they both come from the same spot in the lake, this variation in weight

is accounted for by their individuality. The heavier fish is the more voracious and aggressive; because of this it feeds frequently and consequently takes on weight rapidly.

Size and Weight of Fish

The following table gives the approximate weights of certain fish according to their length:

LENGTH	WEIGHT							
	Salmon		Trout		Grayling		Pike	
Inches	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.
9	....		0	4¾	0	4½	....	
10	....		0	6¾	0	6¾	....	
11	....		0	9	0	9¼	....	
12	....		0	11¼	0	10¾	0	8½
13	....		0	14¼	0	13½	0	11
14	....		1	1¾	1	1	0	13¾
15	....		1	6	1	5	1	0¾
16	....		1	10½	1	9½	1	4¼
17	....		1	15¾	1	14½	1	8¼
18	....		2	6	2	5	1	13
19	....		2	12½	2	10½	2	2
20	....		3	4	3	1½	2	7½
21	....		3	12¼	3	9½	2	13¾
22	....		4	5¼	4	2	3	4¾
23	....		4	15¼	4	11½	3	12¼
24	5	6¼	5	10½	5	5½	4	4½
25	6	1½	6	5¾	....		4	13½
26	6	13¾	7	2½	....		5	7¼
27	7	10¾	8	0	....		6	1½
28	8	8¾	8	15	....		6	13
29	9	8	9	14¾	....		7	9
30	10	8	10	15	....		8	6
31	11	9¾	....		....		9	3¾
32	12	12½	....		....		10	2½
33	14	0	....		....		11	2¾
34	15	5¼	....		....		12	2¾
35	16	12	....		....		13	4½
36	18	3	....		....		14	7½
37	19	12	....		....		15	11¼
38	21	6½	....		....		17	0
39	23	2	....		....		18	6
40	24	15½	....		....		20	0
41	26	14	....		....		....	
42	28	14¼	....		....		....	
43	31	0	....		....		....	
44	33	3¾	....		....		....	
45	34	8½	....		....		....	
46	37	15¼	....		....		....	

Points in Fly-Fishing

Keep your trout line always straight by the motion of the hand, and your fly will keep to the surface whether in still or quick water. In a running stream draw your fly up and athwart the current, sometimes letting it drop down a little. What you want in fly-fishing is motion, always motion.

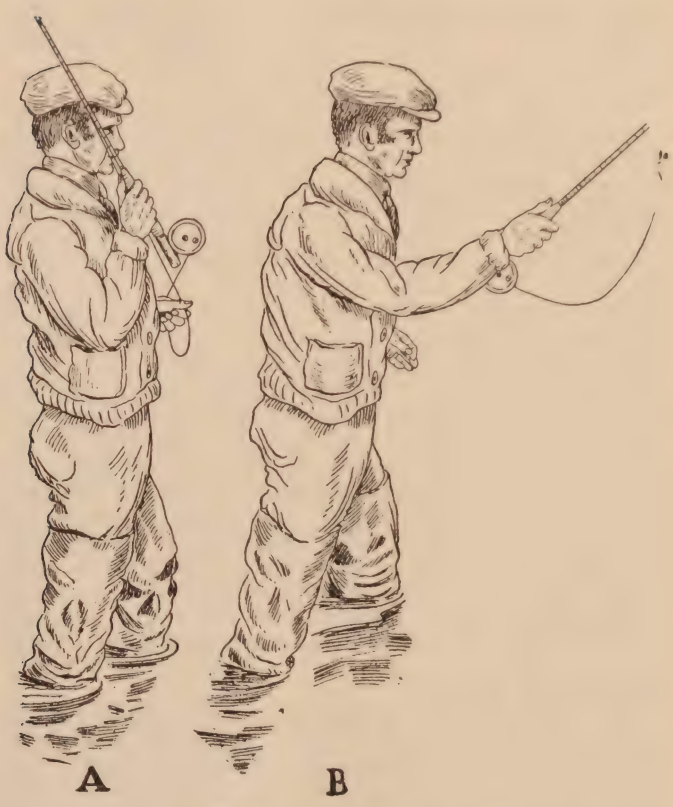
The "Strike" in Fly-Casting

When you have learned to cast flies with some little skill, try to catch a trout. You will find that casting flies and catching trout are not precisely one and the same thing. You will read in books that the instant you see a rise, strike. Don't do it, at least not yet. For the present, when you get a rise, wait until you feel your fish, then a light strike will fasten it. You are but a beginner and your enthusiasm will very likely cause you to forget the delicate nature of your apparatus. If you strike hard you are likely to break your rod, or if the fish is small you are liable to send him sailing through the air over into the next county. Therefore strike just hard enough to fasten your fish and play him in the water until he turns over exhausted. If he pulls too hard of course you will give him line, but make him earn every inch. When he seems very weary you can reel him in, but look out for his last break, for every fish, no matter how tired he may seem, will make a final vicious rush for liberty when he is brought near the landing net, and his capers in this last frantic struggle are dangerous and often end in his escape.—*Kit Clarke.*

Fly-Casting Lessons

The novice may try casting on snow or grass without flies or anything beyond a simple knot in the end of his line to keep it from fraying out. The first thing to be impressed is not to attempt long casts; these are for the distant future. Water is by far the best medium to learn to cast upon, for the resistance to the line when retrieving is exactly what he will experience in actual fishing. For the first cast he takes his position where there is no obstacle behind him to interfere with his back cast. It is entirely upon this back cast, or the retrieving of the line that his

success depends. It must on no account touch the ground or water behind him. Let him begin with about fifteen feet of line, his rod in an erect position, and then make



A—Position of rod and arm at the moment of stopping the back cast and starting the forward cast

B—Position just before finishing forward cast, the slack line being allowed to shoot through the guides.

a forward cast; his elbow close to the body and the movement mainly with the wrist. As the line lies out upon the water, with the rod parallel to its surface, he should draw it back a foot or two slowly, gradually increasing its speed, and then with the spring of the rod send it up behind him with an upward motion of his wrist, stop his rod at nearly a vertical position; then allowing just as much time for the line to be straightened out behind as it occupied in going forward, let him make the cast again with his wrist and send it forward. He should practice this until he can lay his line straight upon the water in the spot where he wishes it to land. When he has accomplished this to his satisfaction, let him take his left hand and reel off a few feet more line while it lies upon the water and before he retrieves it. The resistance of the water will then draw this extra line through the rings, and he must allow a little more time for the line to get behind him than he did before. He must also bear in mind that his rod must not stand at a greater angle than forty-five degrees behind him, and if he attempts to stop it when it is vertical he will find it will go back to about this angle. It would be well to count one, two, three backward, timing it as a musician counts his beats. As he gets out more line, it will be necessary to draw it slightly nearer him, in order to start it from the water, than when he was making shorter casts; but in all cases he must start it slowly, increasing the speed until he gives it a twitch which sends it back, always bearing in mind that it is the rod which is to do the work by its spring, and not entirely his muscles. The cast of a fly is a sleight which is only to be acquired by practice. Should he fail in giving it time to straighten out behind him, he will hear a snap like the crack of a whip, which, in case he had a fly upon the leader, would be snapped off; yet, should he give it too much time, he will find that the line falls in the water behind him and impedes his cast. A longer cast can be made without flies than with them, as a rule, and only when he attains the proficiency of having his back cast go straight out behind

him, and can start it just at that moment when it straightens, without looking behind to see where it is, should he attempt to use the fly. There is a peculiar upward motion of the wrist attained only by practice which sends the fly, instead of straight behind the caster, up into the air, and an expert can do this without danger of catching low bushes, such as alders, etc., which may be close behind. It is during these early days of practice that the novice will acquire a sleight of hand, good or bad, which will stick to him for a long time. Practicing alone he cannot judge of his faults of style. He should beware of slashing his line forward in the hope of getting it out by main strength: remembering that the elasticity of the rod is the projecting power, and that the physical strength of the caster is a very small factor in sending a fly to a distance. Keeping his elbow close to the body in the beginning will teach him to depend upon his wrist more than upon his arm. A beginner should never attempt to cast beyond twenty-five or thirty feet, until he can lay his line straight and without kink upon the water for that distance. He should pay attention to the falling of the flies upon the water. The first efforts will doubtless be accompanied by a splash. He can, however, soon acquire the trick of checking the line and so regulating the tip of his rod that the flies will fall gently. This is one of the most difficult things to explain, but quite easy to do. It is perfectly possible, at a distance of forty or fifty feet, to cast, check the line, and raise the tip in such a manner that the flies shall alight before the line does. In actual fishing we do not often do this, and it is perhaps more ornamental than useful. In long casts the line will strike the water beyond its middle and gradually follow out until the end is reached, even the point where the leader is joined to the line being in advance of the flies, until this point touches the water, where the flies go on beyond and straighten out to the full length of the cast. The beginner should, by all means, have a friend to watch when the line goes behind him, and caution him to give more or not quite so much

time, although it is seldom the latter caution will be used. Our own experience in teaching novices has been that they fail in not giving the line time enough behind them in order to have it perfectly straight and no whip cracking in the rear. In practice, haste should be made slowly, and a certain distance should be well covered and cast with certainty every time before any increase is attempted. Casting with the wind is by far the easiest, and one should begin in this way if there is any wind; afterward he should cast against the wind, when he will find that with a moderate breeze he requires more vim in the cast than he does in the recovery when the wind helps him to get his line well behind. He should by all means learn to cast with both hands, that in actual fishing he may rest one arm by casting with the other, a very great advantage, as he will find in a day's work. No amount of teaching will make him a good caster; practice alone will do this.

Caution in Fly-Fishing

More caution is necessary in fly-fishing than in bait-fishing, as objects beneath the surface of the water do not frighten the fish so readily as objects on or over the surface. Keep out of sight of the fish, don't let the shadow of your rod or yourself fall on the water, and keep as motionless as possible.

Casting Against the Wind

In fly-casting against the wind, lift your line from the water so that it extends behind you at an angle of 45°; then bring your rod down sharply right on to the water, and straight against the wind. This makes the line cut through it and extend out straight on to the water.—*Ira Wood.*

Bait-Casting Lessons

If you are an absolute stranger to the art, your very first question will be: "Why take up casting, anyway?"

And I will answer that the average fishing trip is a pretty slow time. Waiting, waiting, waiting for a bite. And the bite you get is very liable to be given you by a hellgramite you have let loose in the boat. You get sunburned. You get cramped. You get sore. You get a fish once in a while perhaps if one takes a notion to start out and hunt for your bait.

Now, bait-casting is not a waiting game if you play it right. Instead of dozing away in an anchored boat, you would be accurately shooting your artificial lure into every spot where a bass might be lurking. You would enjoy just being able to drop the bait where you wished it to go. And best of all, you would be hunting for the fish, not waiting for him to come to you.

Furthermore, the stringing of night-crawlers, and hooking of frogs, dobsons and crickets would be a thing of the past, for nothing but artificial bait should be used. Your rod in a bag, and a tin box containing your reel and lures make up all the baggage you have to carry. And if you are at all familiar with the habits of bass, no still fisherman need worry you as to results. If you get at all proficient in handling your artificial lures, no live bait will take any more or larger fish than the artificial baits will, in the same waters of course.

One word more before I start on the outfit and how to use it; for I want you to be really sincere and a true convert. If you fish in water that has never had any bait-casting done in it—and there are many such places still—you are dead sure of lots of sport. Don't let anybody make you believe that bass in such and such a lake won't touch artificial lures. If there are any bass in a lake or river and you handle the artificial bait skilfully, you will get all that you or any other sportsman are entitled to. There are off days, of course, but there are on days, too, and plenty of them. Now let's get busy.

The first thing you need is a casting rod. Any kind of rod will not do. If I were arguing with skilled bait-casters I might go into details about why you should get a rod of certain length and quality, but I am talking to beginners now; so I advise you to get a split bamboo, two-piece rod of five and one-half feet in length. An-

other good rod—and one that will give you real service is a Bristol steel rod—a number 30—five ft. or five ft. six makes an ideal bait-casting rod. It is stiff enough for the heavier lures yet whippy and delicate enough for the lighter ones. For a reel get a quadruple, multiplying bait-casting, or better yet, a popular make anti-backlash reel. Now you cannot walk into a store and buy any reel that is a quadruple multiplying and do casting—that is, real casting. You have got to have one of the better grade, costing from 6 to 35 dollars. You cannot cast with any kind of line that you happen to get hold of. No matter how excellent the balance of your outfit may be, if your line is not adapted to bait-casting, you won't cast worth mentioning. Get 50 yards of No. 4 Square Braid. After you have worn this line out for your next one, get the same brand, but let it be a No. 5 size.

Now for the lures. You want three baits to start with: One underwater minnow, one pork-rind lure, and one surface lure for shallow water or where snags are plentiful. I myself doubt very much if color has much to do with strikes. The secret of strikes lies not in the color but in the action. Bass don't bite artificial lures that are quiet.

The above three minnows—you need but two—will get the bass if anything will. It may happen that you would like a weedless lure to use in places where grass, lily pads, brush, etc., are very thick. The best thing in this line for you to get is one of the struggling mouse lures. This bait casts beautifully and is the nearest to being weedless of anything I have ever handled that would catch fish. You will miss many strikes on this lure but there is the satisfaction of knowing that without it, you would not be able to successfully cast into the weeds at all.

Now cut out a piece of wood about 2½ inches long and ¾ of an inch in diameter. In one end fasten a small screw eye, in the other end insert sufficient lead to make the block equal the weight of one of your underwater minnows. This block will be your practicing weight.

Get out your rod, reel—on which you have carefully wound your new line—and the home-made casting weight. Rub a little oil on the rod slide-joint before inserting it

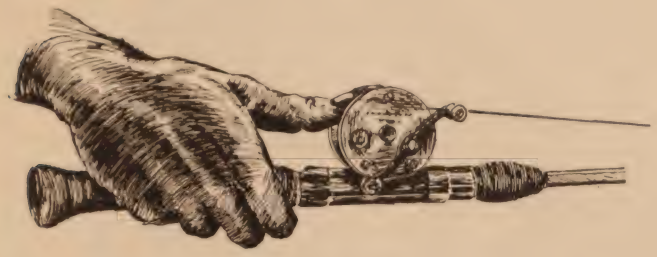
into the ferrule and thus insure easy dismounting. See that reel seat and guides are in a straight line from butt to tip to permit free running of the line. Put on the reel as follows: Turn rod so reel seat is up. Attach reel with handle to the right when butt of rod points towards you. Run your line from reel to first guide and see that it passes directly to the guide from the reel spool without chafing on the reel. Thread the line through the balance of the guides and then attach your practice weight to the end of the line. Walk out on your lawn where you have a good clear space around you and above you as well. You will need plenty of room to start with, as it is a rather uncertain thing to know just where a beginner's cast is going to land.

Lay your hat or some other like object on the grass about thirty feet from where you intend to stand when you cast. This will serve for your target. Face the target. Have your right foot slightly advanced. Grasp your rod, with the reel on top, in the right hand having all of your fingers underneath the grip but the thumb is to be on top. Grasp the rod butt close enough to the reel so that the ball of the thumb will rest on the spooled line on the reel. Remove the click so that the line will be free to run out easily if not checked by thumb pressure.

Now let out enough line so that the weight will dangle about four or five inches from the rod tip. Extend the arm straight out, pointing the rod at the target on the grass. As you stretch out your arm, turn the wrist anti-clockwise until the reel spool is vertical. This movement will bring the reel handle on top and allows the spool to rest on the end bearing at the click-end where it will revolve the easiest.

Bring the rod straight back over the right shoulder until it forms an angle of about forty-five degrees with the ground in back. Let it rest a moment until the weight stops swinging. Your right hand will be up near your right ear. Keep your eyes on the target all of the time. Now with increasing speed, bring the rod straight forward over the shoulder in a direct line with the target and yourself. Keep your thumb pressed down hard on

the spooled line to prevent any line running out until the rod, in its forward movement, is about vertical. Then release the thumb pressure and the weight will shoot out. Don't stop the swing of the rod but keep it swinging until it is pointing a little bit above parallel to the ground in front.



Making the cast

Keep the thumb just touching lightly on the line so as to offer a slight friction and prevent the reel from over-running and causing a backlash. Just before the weight hits the ground, press the thumb down hard on the spool and stop the line from running out any further.

You have made your first cast. There is one of three things that will happen. Your weight went out onto the grass in the direction of the target just as you intended it should. If not, it either shot up into the air over your head or else it plugged into the ground at your feet. If it went out towards the target, your cast was correctly made. If it went up into the air, you released your thumb pressure too soon. If it shot down to the ground directly in front of you, you did not release the thumb soon enough. There you are. With that information, you should be able to make good headway.

After you get so that you can land the weight out in the grass in some direction, which very likely will not be very near the target, then you will be ready to try for accuracy. You have got to acquire accuracy, for a caster without it, is not a caster. No, he is a dangerous customer to get close to when he is in action.

When you swing your rod forward in the cast, swing it as you would a twenty-foot pole and were going to "swat" a woodchuck or skunk with it. In this instance, the hat on the grass is to be the victim. What I wish you to understand is that you must bring your rod forward in a direct line with whatever you are casting at. This movement will send the weight out towards the target. If the weight is going too hard and too high it will fly completely over and beyond the target. If this is the case, thumb pressure is to be applied to the spool and the weight will slow down and settle. A little practice and a good deal of judgment will soon enable you to drop your weight about where you want it.

After you have managed to acquire a bit of proficiency, then, as your weight shoots out, keep your rod pointed directly at it. As the weight settles, lower the rod tip. This movement permits the line to draw in a direct line from the reel spool with a minimum of friction. Thus you are enabled to cast with little effort and at the same time your line will last longer.

Retrieving the line

Now you are ready for a word or two about retrieving your lure. As soon as the bait has landed on the ground, transfer the rod to your left hand. Grasp the rod by the grip that is above the reel seat, having the hand underneath with the thumb up on the left side and the index finger up on the right side. Press the rod butt against the stomach and reel in the line, guiding it onto the spool as evenly as possible with the thumb and index finger of the left hand and laying just enough stress on the line to spool it evenly—not loose or too tight. Be

sure to spool the line evenly with a regular traverse across the entire width of the reel spool, not allowing the line to pile up in a ridge at any place or permitting it to run up the ends of the spool. The success of every cast lies mainly in the manner in which the line was wound onto the spool after the previous cast.

While you are getting familiar with this part of the art, keep your eyes on your reel so you can see what you are doing. Later in the game you will forget all about spooling your line, for it will be done without any special thought on your part.

As you begin to become proficient in casting and retrieving, then work your rod butt away from your stomach, for besides not being a graceful position, it is unhandy when you strike a fish. The style to adopt is to hold the rod with the click end of reel in the left palm. All fingers underneath the rod. Guide the line onto the spool with the tip of the thumb which will extend over the top of the reel when held as described. Press the line first with one side of the thumb and then with the other. This position gets the rod well away from the body and permits freedom for a good strike to set the hook when a bass takes hold. And set the hook good and solid when you do get a strike. It is a mighty good start towards getting the fish onto your stringer. A fish with the hook set deeply doesn't unhook himself even if you let him run around loose for ten minutes. "Spitting out" the hook never happens if the barb is well in.

If you will now follow the instructions I have given, you should soon be able to cast very well without any personal supervision from a caster. Above all things, stick to the overhead cast such as I have described. Don't take up that inefficient underhand cast to start with or you will keep it up and never amount to a "hill of beans" as a bait-caster. Remember this, if you happen to be fishing and meet a caster who employs the underhand cast only. You just make up your mind that you will have him nicely trimmed before the day is over. The overhead caster puts his bait just where he wishes it to go, while the average underhand caster puts his

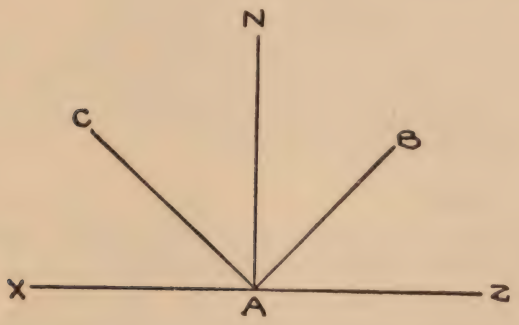
lure just about where it happens to land. This is not true in every instance, but it holds good in the majority of cases.

George S. Brown.

Minnow Casting

In casting for black bass, having properly adjusted the rod, reel and line, tie on the swivel by one of its rings, and loop the snell of the hook through the other; run the point of the hook through the under lip and out at the nostril of a good-sized minnow, say 4 inches long, reel up the line until the swivel touches the tip and make a cast. The angler is supposed to be standing at *A*, facing *N*, and his shoulders in a line with *X Z*. Casting the minnow is an entirely different process from casting the fly. A minnow can be cast but a very short distance immediately in front of the angler, and all long casts must be made sidewise, that is, to the left or right. To make a long cast to the left we will suppose *X* to be the objective point to which the minnow is to be cast. The angler now grasps the rod immediately below the reel with the right hand, with the thumb resting lightly but firmly upon the spool; the right arm is now extended downward, slightly bent with the elbow near the body, and with the extreme butt of the rod nearly touching the right hip; the thumb and reel are upward, inclining slightly toward the left; the tip of the rod, or rather the minnow, just clears the ground or surface of the water; the position of the rod is now in the direction of the line *A B*, inclining toward the ground or water, making an angle of about 45 degrees with the line of the shoulders, *X Z*; this is the situation at the beginning of the cast. Now for the cast: The angler turns his face toward *X*, the objective point, looking over his left shoulder without turning his body; he now inclines his body in the direction of *B*, advancing the right foot and bending the right knee slightly, and makes a sweeping cast from the right to the left, and from below upward, across the body diagonally, until the rod hand is at the height of the left shoulder, and the arm and rod extended in the direction of *A C*, with the tip of the rod inclining upward. The movement of the right hand is almost in a straight line from a point near the

right hip to a point near the left shoulder; the motion in casting is steady, increasing in swiftness toward the end of the cast, and ending with the "pitching" of the bait—instead of a violent jerk—somewhat similar to the straight underhand pitching of a baseball. In making the cast,



the right elbow should touch the body, sweeping across it, and only leave it at the end of the cast, making the forearm do the work. At the end of the cast the reel and thumb are upward, and the rod forms an angle of 45 degrees with the line of the shoulders *X Z*, and the minnow instead of following the direction of the rod *A C*, as some might suppose, will diverge toward the left, and drop at *X*, when the thumb should immediately stop the reel by an increased pressure. Casting to the right is just the reverse of the above proceeding. The angler being in the same position, brings the right hand across, and touching the body, to a point in front of the left hip, the thumb and reel upward, but inclining toward the body, and the rod extending in the direction of the line *A C*, with the tip downward; he now turns his face in the direction of the objective point *Z*, inclines his body and advances his left foot in the direction of *C*, and makes a cast from left to right, and from below upward, and ends the cast with the right arm and rod fully extended in the direction of the line *A B*, while the minnow takes its flight toward *Z*. In making a cast to either left or

right the body should sway or move slightly in the direction, and simultaneously with the rod arm; it will give force and steadiness to the cast; but on no account must the body be turned around or the feet moved during the cast; let us be graceful if we cannot be proficient. The first cast that the beginner makes will be likely to throw the bait behind him; this will be because he will not end the cast in time, but carry the tip of the rod too far toward the line *X Z*. He should by all means begin by making short casts, and lengthening them as he perfects himself by experience in managing the reel and controlling the cast.—*Henshall.*

The "Whip"

The leader with its flies is called the whip. The fly at the end is the stretcher, drag-fly or tail-fly; those above are drop-flies, droppers or bobbers. The stretcher should generally be the largest (Roosevelt says the smallest), as, the weight being then at the end, a longer cast can be made and the resistance in drawing it over the surface keeps the leader taut. When casting a short line (18 to 25 feet), the dropper should not be more than 30 inches from the stretcher. When the novice learns to cast well the flies may be 4 feet apart. For the beginner the leader should not be more than 4 feet long. After it may be increased to 5 or 6.

Rigging the Cast

In rigging the cast for fly-fishing, if the leader is provided with loops at each end, and for drop-flies, proceed as follows: To the small end of the leader attach the stretcher or tail-fly by passing the loop of the leader through the loop of the snell and over the fly, then draw together. Two or three feet from the tail-fly attach the dropper or bob-fly, in the same manner, that is, put the loop of the snell over the loop of the leader, and push the fly through the latter loop and draw tight; or, if the leader is not furnished with loops for this purpose, slip a

knot of the leader (about 3 or 4 feet from the tail-fly) apart, and after making a knot in the end of the snell of the fly, put it through the opened knot of the leader and draw together; this will hold firm, and the dropper-fly will stand at right angles from the leader. If, however, the gut lengths of the leader are tied by hard, close knots, instead of the slip knot or double water knot, then the snell of the dropper must be attached close to, and above a knot of the leader, by a single knot or half-hitch, a round knot having previously been made in the end of the snell, to prevent the half-hitch from working loose; this is probably as good and safe a way as any.

Knot for Snood Loops

Hold the cord in the left hand, and with the right hand make first a small (Fig. 1) and then a larger loop (Fig. 2),

FIG. 1.

FIG. 2.

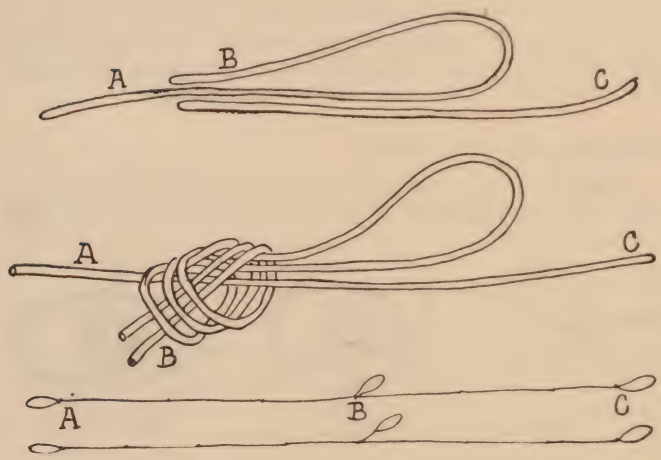
FIG. 3.

placing the end of the cord under the smaller one (Fig. 3). Now insert the large loop through the smaller one from the back at *A* and draw tight.

Attaching Droppers

In tying lengths of gut together to make the leader, when you arrive at the point where it is desired to have a dropper loop, say 30 inches for a fine trout leader, or 3 feet for a heavy trout or bass, from the lower end to which the stretcher fly is looped, double the gut back, making a loop up the leader, lay the other upper strand alongside, as in Fig. 1, then make a curl in them all and pass loop and line gut through, or in other words, make a knot, as in ordinary tying. It will then present the appearance of

Fig. 2. Then draw down tight, and having the gut well soaked and soft, take the loop just tied in one hand and the upper end, *C*, in the other, and pull them strongly apart, so that the loop will be pulled down the line. Then, when released, instead of pointing straight up the leader



and lying hard on *C*, it will point out nearly at right angles. The loop is seen on a completed leader in Fig. 3, in which *A* is the stretcher loop, *B* the dropper loop and *C* the upper or reel line loop. This way enables any man, whether he be an adept in making tackle or not, to fasten on or take off in a moment a dropper as easily as a stretcher. The advantage of tying the loop into the line in this way is that pointing up and being a short stiff loop, the dropper always stands out at a right angle with the line, making it an impossibility for it to foul with the leader; the hook is never curled over the line, so if a fish strikes he gets it into his mouth as easily as the stretcher fly.

Wax for Snelling Hooks

Burgundy pitch 120 grains, white resin 60 grains, tallow 20 grains. Powder and mix the pitch and resin and put into an oven in a pipkin. When melted add the tallow or stir all together. Let the mixture stand twelve hours.

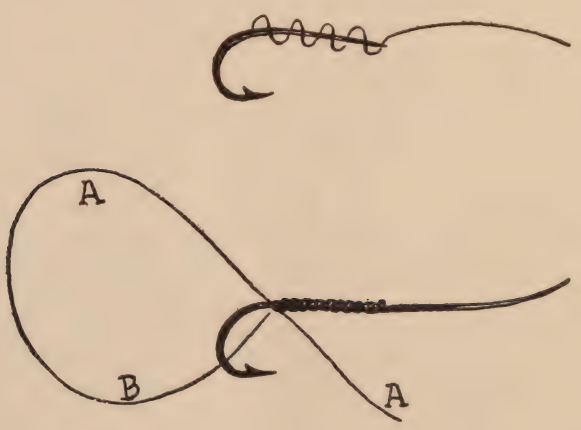
Wax for Gut Leader

Take 2 ounces best resin and ¼ ounce beeswax, simmer together in pipkin for 10 minutes; add ¼ ounce tallow; continue to simmer 15 minutes, then pour the mass into a basin of cold water and work with the fingers until it is pliable.

Snelling or Gimping Hooks

When the gut is selected cut off the imperfect ends and place it in tepid water until it is thoroughly soaked and soft, then tie the end loop by doubling one end of the gut length and making a common knot in the doubled portion. The hook can now be tied on while the gut is soft, or the gut may, by making a knot in one end and using a pin in the loop, be stretched on a board to dry and then tied. The whipping is the same in either case, but if the gut is whipped after it is dry, the parts to be covered by the silk must be nicked or dented, which is done between the teeth, care being taken not to bite so hard as to split the gut. You will find the whipping equally secure whether the gut is either wet or dry. Another thing you will find makes no difference; that is, whether the whipping begins at the end of the shank and extends toward the bend of the hook or *vice versa*. From tying reenforced snells, one gets into the habit of beginning the rounding at the end of the shank; but if you always fasten the silk with an invisible knot, there is little danger of a fish cutting the knot with its teeth, as has been claimed they will do. A snell is quite apt to become weak or even break just at the end of the shank from contact with it. Some shanks terminate in a veritable point; such are cut off with a pair of cutting pliers and then filed smooth with a fine file, but all hooks larger than No. 3 Dublin, Limerick (O'Shaughnessy), are "reenforced" by making the gut double for half or three-quarters of an inch above the end of shank. The easier way to do this is to make a long loop with a

common knot similar to the loop made for attaching the snell to the leader. If one's gut-lengths will not warrant this appropriation, a short piece of gut may be wound on to the shank with the snell, and the free end of the extra piece fastened to the snell with a bit of waxed silk. Having gut-lengths, hooks, wax and silk, wax thoroughly a piece of silk by holding one end between the teeth and the other in the left hand. Holding the hook at the bend between the finger and thumb of the left hand, lay the end of the waxed silk on the shank a little above the point of the hook and take four, five or six turns, according to size of hook, with the silk around shank until the end is reached. Then make three or four turns of the silk close together, just at the ends, so as to completely cover it, as a cushion or shield against the wear of the steel, should it come in direct contact with the gut. These first few turns of the silk make a spiral ridge around the shank which



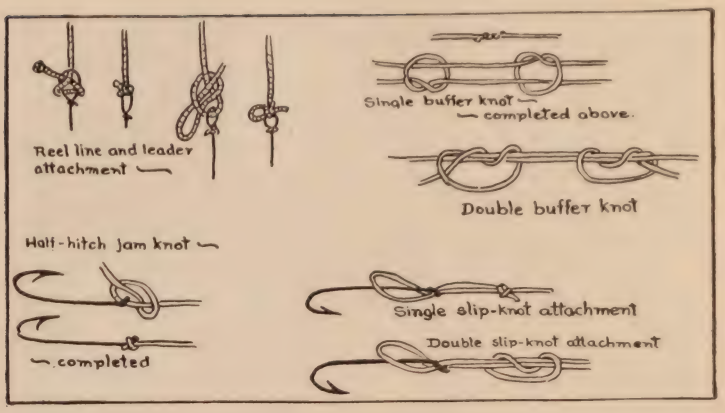
acts like the marks on the straight shank when using soaked gut, and with dry gut act in combination with the dents made with the teeth to prevent the steel and gut

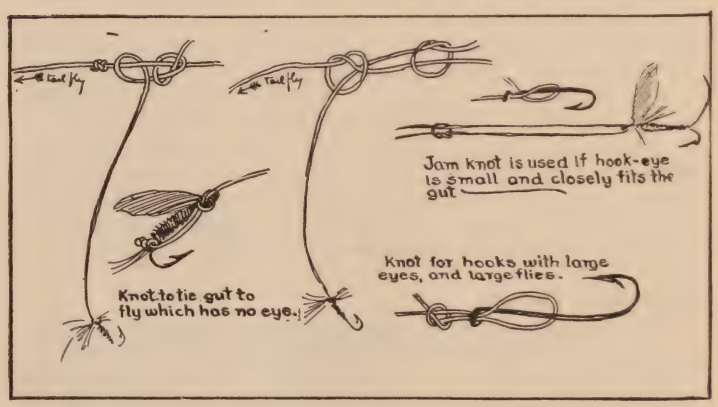
pulling apart. When the end of shank is covered, lay the gut length on the back of the shank and wind the silk closely and tightly to the point of beginning. Notice the silk as you wind to see that it is well waxed, or wax as occasion demands. When the starting point is reached lay the free end of the silk on the winding with the end toward the end of shank, which makes a loop in the silk, then take the slack of the loop and continue winding for three or four turns, but wind over the free end of the silk. The following diagram will show the manner:

A A, free end of silk turned back on winding. Take slack of loop at *B* and wind over silk, *A A*. Then take free end of silk and draw tight and cut off closely. When the winding or whipping is finished it will be found that the wax has been squeezed to the outside of the silk by the pressure in winding. This must be rubbed smooth with finger and thumb, when it will appear that the silk is nicely coated with the wax. With a camel's hair brush go over the winding with orange shellac and put aside to dry until the alcohol evaporates, leaving a smooth coating of shellac over the silk and wax. It may be necessary to renew the shellac after a time, but one will have had so much fishing with hooks tied in this manner before it is necessary, that it will be done with thanks for past services. Hooks are tied to gimp in the same way as above described, except black linen thread is used instead of silk, and the loop in the end of the gimp snell must be made by winding the doubled parts instead of tying.

Snooding Hooks

To snood hooks with silk-worm gut, instead of fastening the gut directly to the hook, fasten a small loop of relaid linen line No. 5 to the hook. The loop should be quite small, not over ⅛ inch. Then prepare the gut by tying a loop at each end, one for attaching the hook through the small loop on hook, the other for attaching the line. Many advantages are gained by this method, the gut is double near the hook, it also forms a flexible joint and avoids the annoyance of chafing or breaking off by being bent short; in case a hook is broken, another can be easily attached to the same gut. Hooks and gut can be carried separately and attached when required for use.




Jam knot is used if hook-eye is small and closely fits the gut
Knot for hooks with large eyes, and large flies.
Knot to tie gut to fly which has no eye.

Anglers' Knots, Loops & Ties

Restoring Gut

Gut that has become brittle with age may often be restored by rubbing with a cloth soaked with glycerine. Gut that has turned straw color is worthless. Keep leaders and gut away from all leather except chamois skin.

Tight Joints in a Rod

To loosen the tight joints of a rod heat them with a lighted match.

Varnish for Rods

Thin down coach body varnish with spirits of turpentine until you can apply a coat so thin that no brush marks show. Hang the rod then in the wind and sun, and when perfectly dry apply another coat. Three or four coats will suffice.

Care of Rods

At the beginning of the season clean all the metal parts with rottenstone and sweet oil, but never touch the male ferrules. Then with a piece of old fine felt, a little extra fine pumicestone and raw linseed oil rub it down thoroughly, being careful in the wiping not to chafe the silk; wipe off very clean and let it stand for a day or two to get dry. Then take a fine-haired flat brush and with hard oil finish give one coat, suspend the rod by strings for one or two days and give the second coat, and suspend again for five days or more and let it get hard. Now take old felt, raw oil and rottenstone and rub it lightly, but thoroughly; wipe off with an old rag and you will have a handsomely finished rod. Water will not affect it. When you quit fishing wipe the rod dry, and when you get home or to camp rub it well with raw oil on a rag and oil the male ferrules with a drop of good gun oil, polish your mountings, place in a partition bag and hang up in a cool place. If you tie the bag tie it loosely.—*W. S. S.*

Dyeing Lines

To dye blue, soak in indigo water; the stronger the dye the deeper the color. To dye green, soak in a strong decoction of green tea. To dye brown, soak in strong coffee.

Dye for Leaders

Dye leaders used in clear water with the juice of milkweed, or equal portions of Arnold's fluid (ink) and water. To dye green use Arnold's fluid "straight."

Preserving Gut

Silkworm gut will keep nicely if laid full length in paper slightly oiled and the rolled gut and paper placed in chamois skin.

Fractured Gut

Tests made by "Pisco" demonstrated that when a length of gut leader has been once broken by a strain it is so weakened by the force of the strain that it is injured through its entire length, and is worthless thereafter.

Soften Silk Gut

Soak for some hours in strong vinegar. Snells should not be used until softened, the same as a leader.

Waterproofing a Linen Line

Saturate with fine paraffine dissolved in pure benzine. It will be well preserved and will run well through the guides.

Waterproofing a Silk Line

Take 2 parts boiled linseed oil and 1 part best coach-body varnish mixed together and warmed until it will singe a feather. Soak twice and rub once, the mixture being at a temperature not exceeding 100° F. Finish and polish with paraffine candle.—*H. P. Wells.*

Kinking Lines

The kink in a line can be removed by dragging it at full length for some time in the water astern of a boat.

Preserving a Net

To preserve a landing net, soak it thoroughly in linseed oil; shake it, and hang up in the sun to dry. Shake off the drops of oil as they collect on the net until it is dry.

Sheet-Lead Sinkers

If you carry with you some sheet-lead you can always make a sinker just the weight you desire by wrapping it around the line.

Adjuncts to Fishing Outfit

Besides a file it is handy to have a small hand vise to hold your hook while filing its points or while wrapping on a snood. Pliers are useful, so are cutting pliers and oil for reel and swivels; also silk for wrapping, wax and shellac.

Pocket Minnow Net

Take a bung or round block of wood of 2½ to 3 inches in diameter and bore four holes opposite to each other in the edge of it. Then insert a piece of umbrella rib, about 12 to 14 inches long, in each hole. The holes must be made deep and small enough for the wire to fit tight. The paragon wire is the best. Leave the end of the rib that has the little eye in it outside. Lay the bung and wires on a square piece of mosquito netting and stretch it and sew it firmly at the four corners to the eyes in the ribs. In the center of the bung put a screw-eye, and in the center of the mosquito net sew a piece of string, leaving ends about 8 inches long. Any straight, stiff stick picked up on the shore serves as a handle, being made fast to the net by a strong piece of twine through the screw-eye, and with a piece of bread tied in the net with the string, and perhaps a small, flat stone to make it sink, it is ready to catch minnows. They will come over the net for the bread, and when it is raised up quickly the resistance of the water causes it to belly, and the minnows will not get out. When bait enough has been taken, pull the wires out of the holes, drop the bung into the net and roll it up on the wires.

Preserving Trout

Trout carefully dressed may be preserved several days fresh and sweet, without ice or salt, by wrapping them in the long white moss found in the swamps in the vicinity of the lakes and streams where trout are caught, and placing them in a cool shady place; a hole in the ground covered over with a foot or more of earth is a good place.

Stocking Trout Streams

Trout eggs must be deposited and kept in a current of water. A mere change of water is not sufficient. The temperature of the water should not be above 50° and not below 35°. They will hatch in 45 to 50 days. Put the eggs in shallow water on a bed of gravel which is kept clean and bright by the current, and as far upstream as possible. Trout will thrive in water which never rises above 65° or 70° in temperature.

Crawfish

Crawfish are most easily captured in a small rocky stream. Gently lift a rock and you will see him backing away. Don't be afraid of him because of his claws, but grab him tight, just behind the head. Put in a tin pail, partly filled with rocks or small stones, and change the water often. Not much water is needed, just enough to keep the gravel in the pail real damp and cool. Damp moss will also serve the purpose admirably.

Skinning Eels

To skin an eel, roll him first in ashes or dust so that his skin won't be slippery. Then cut the skin around the neck near the head, make a longitudinal slit half the length of his body, and grasping the skin firmly near the head peel it off over his tail.

Preserving Frogs

The best frog for fishing is the spotted or leopard frog, found most frequently in marshes and around the reedy shores of lakes.

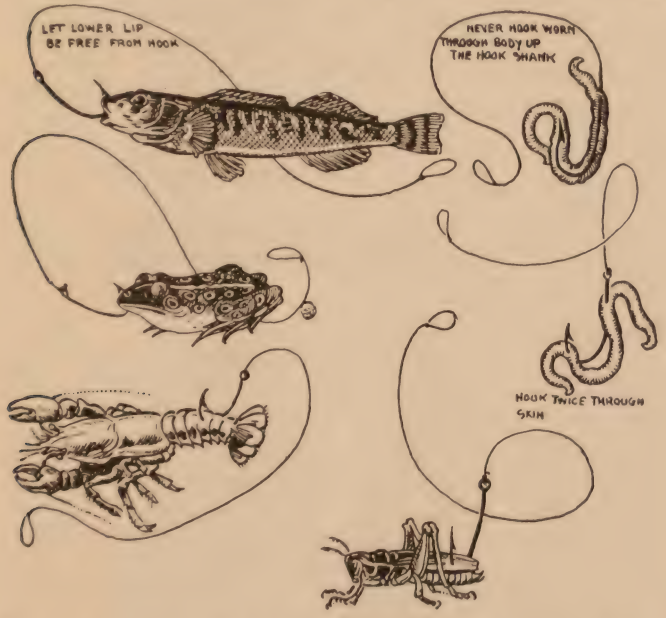
To keep him in good shape, make a box about 15 inches square, with wire sides and top. Fill it with damp grass and moss, occasionally dampening it, as frogs must be kept cool to preserve their pep. Use coarse wire screen, as enough bugs and insects will work in to feed the frogs for several days.

Preserving Minnows

With proper care, minnows can be kept in good condition for a long time. In camp a permanent minnow box should be sunk in shallow water, the bottom filled with gravel and stones. Wire screens for sides give a steady change of water.

Always dip the minnows from the minnow bucket with a small net; don't handle them till putting them on the hook; and at no time pinch or squeeze them.

The larger the minnow bucket the better and if they are to be carried any distance, put in a bunch of water weeds, which save the minnows from any injury due to rough travel. When carrying minnows any distance don't crowd them—fifty to a five-gallon pail is enough. A pinch of salt added twice a day gives them life. Change



Showing the proper method of hooking various kinds of natural baits in order that they may live and prove attractive to game fish

the water often, and if possible carry along a small pump and areate the water every so often by pumping air into it.

Worms as Bait

There are four kinds of worms best for fishing purposes:

The black-headed worm, without the band or ring. It is a dark worm and the toughest and best to hook of the lot.

The ringed worm. With a ring around the body, near the middle, is a flatter-looking worm and found around manure piles, etc.

The marsh worm. Has a whiteish ring and pale blue in color, is found under stones; logs, etc.

The red-headed worm. Found near manure heaps and decayed leaves; is quite thick in proportion to its length. It is dark red and loses its color after being in the water for some time and is not as good a bait as the others.

As soon as worms are dug up they should be washed in a pail of water and then put in a crock or jar of moss. This keeps them clean and fresh and the moss extracts the water from their bodies, toughening it for the hook.

When hooking the worm, loop it on the hook in about three places. This gives it an opportunity to move around and attract fish.

Horse-Hair Line

The man who goes into the wilderness will find many commendable qualities about this line. *First,* a line such as this does not soak up water like the silk or linen lines, so that it is impossible for it to decay. You can hang it up anywhere; take it out in the spring of the year and it will be as good as ever. And, *second,* it does not collect ice along its length when fishing in the winter, a common failing with linen and silk lines; and of course, the further north you go the greater the chances of having to poke your line down veritably like a stick, owing to the collecting of ice along its length. But best of all is its imperviousness to soaking water. In a word, it is waterproofed and even

"enameled" (by nature if you will), and *third*, no matter how bristling a series of fangs a pike or muskalunge may have, he will find it mighty hard to cut through this line with his teeth. They resist the teeth like steel wires, whereas merely the catching of the silk line on a fish tooth, sufficient to separate a strand, is enough to cause the breakage of that line and the get-away of a mighty fine fish. I make the assertion that if I were ever to go into the woods to spend a prolonged time, and would of necessity have to depend upon worth-while lines, then most assuredly I would want to have about three or four, fifty to one hundred foot horse-hair lines. I know that I could depend upon them, where I could not upon others; and I know that I could hold some mighty big fish on them.

I am going to tell in the following how to make an eight-strand line. This line will hold a twenty-five to thirty-pound fish. That will give you an idea of its strength. If you wish to make heavier lines, then you can add strands as you desire.

Selection of hairs for such lines depends somewhat, I imagine, upon the animal it is taken from and its vitality. The healthier the animal, the stronger the hair, and *vice versa*. The color of the hairs and the line, if you will, is probably one of some moment. For a general purpose line there is nothing to equal the black or some shade of black. But if you have not access to such, then a lighter color is all right. I have not tried dyeing horse-hair lines, but I imagine that it could easily be done. The thickness or caliber of the hairs to be used in this line is a matter of some concern. Do not select the heavier outer hair, the longer ones of the tail. Rather select the inner ones, those that are most flexible and medium fine. These, when made into a whole, provides the best line of the lot.

Now with a hank of horse hairs you are ready to begin, first having your "tools" on hand. I have in my drawings sought to carry out very carefully the various details necessary and I am sure that they will readily be followed. Figure I shows the winding or twisting stick. It is cut from a tree, the arm (A) being three inches or so in length, the body of the stick being thicker and some seven or eight inches in length. You will need three of these,

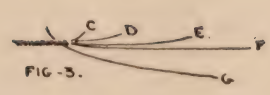


FIG-3.

FIG-4.

STEPS IN MAKING THE HORSE-HAIR FISHING LINE

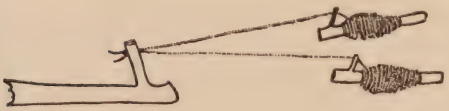


FIG-5.

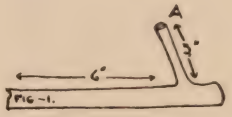


FIG-1.

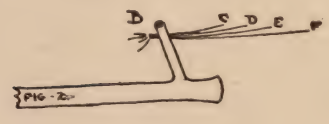


FIG-2.

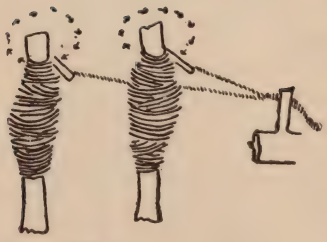


FIG-6.

one a little heavier in diameter than the other two, the reason for which will be seen later. With this stick ready, cut a slit at the tip of the arm. Now select four strands of horse hair; tie them together, twist them and then insert them in the slit of the twisting stick. The letter (B) will show what is meant. Now notice that the four hairs are not of the same length. The hair (C) is the shortest; the hair (D) is next, and so on. With the hair in place, start to turn the twisting stick as shown in Figure 4, holding the ends of the hairs between the thumb and the forefinger in a very tight pinch. You can twist this as much as you desire. By glancing at it you can tell just about when it is twisted aplenty. Then the line that is twisted is removed from the slit and is wrapped around the stick and tied. Then the line is again inserted, the twisting is continued, when twisted, is lifted and wrapped around the stick and so on.

We now come to the matter of inserting the hairs as the various lengths give out. The hair (C) will give out first. Select another hair now, which will be (G), and insert it in the twisted portion of the line just forward of (C) as shown in the insert. Start now to twist again, being sure that (G) is caught in well *and that it actually twists around and around as you turn the stick.* After you have twisted for a ways pull the line to see if (G) pulls away. If it pulls away then it is not securely in place and it will have to be inserted again. In this manner keep on, inserting hairs when needed; twist the line, lift it out of the slit, wrap it around the stick. That is the simple process of it.

We will suppose now that you want a line of some fifty feet. With this in view make sufficient line to cover that length and in the end you will have it wrapped around the stick. It can then be laid aside. Now another stick (the second one) is brought into use, and another line of four strands, fifty feet in length, is made on that. You will then have two sticks with line on them as shown in Figure 5 ready then to be twisted into another single line, the two lines of four strands each making a line of eight strands. You will now select the third winding stick (H). Into the slit of this, the two lines as shown in Figure 5 are inserted, the two to be tied

together at the end. One can have a second person, if this is convenient, to hold the stick (H) while the other two are twisted. Take hold of these two twisting sticks as shown in Figure 4, and turn them around, both the same way as denoted by the arrows. The peculiar twist will cause the two lines to come together. Twist as tight as desired, then advance and insert anew in the slit as shown in (H). (The first thought when one is twisting a line like this is that it will untwist as it hangs free. This will surprise you, for it will not. It is true that when you hold it up free it will untwist a little, but just a little, and then it will stay that way.)

Proceed then by attaching to the end of the winding stick containing the finished line, a weight of some kind not to exceed a half pound, or heavy enough in all events to hold the line stationary while the twisting is done. This can be hung over the back of a chair, etc., so that when the line is twisted it will turn of its own accord to untwist a few times, as I have mentioned; then, when the untwisting is over, it can be wrapped on the stick and the twisting of the two lines together can be continued. The method once seized upon is very simple, but unless understood its very simplicity is as intricate and as little to be understood as a Chinese puzzle. But master the various moves and you will be surprised how smoothly and well one can take up the making of a line of this sort. I will admit that you may meet with some minor difficulties in the twisting, but even the poorest amateur, if the various moves are mastered, should be able to make a line after a few attempts.

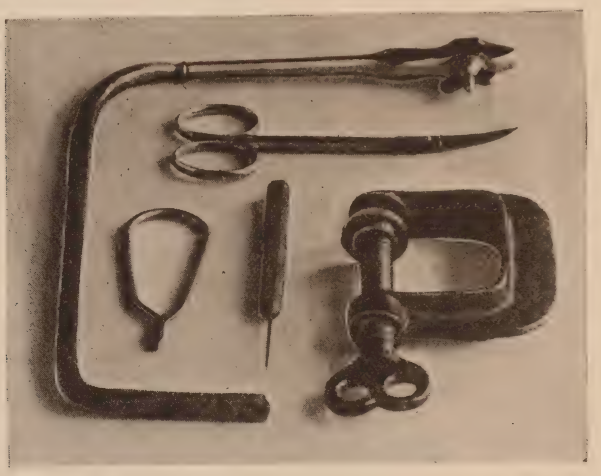
When your line is completed, stretch it out and pull it and go over it, rubbing it down by having a glove on your hand so that the fingers will not be hurt. It will be noticed that the ends of the hair where each was inserted in the line will be sticking out here and there along the whole length. Do not clip these off when the line is made, nor when you have stretched it and rubbed it down. Use it to fish with for a little time so that each hair is stretched its full length, to pull in as much as each will go, then the ends of the hairs thrust out here and there may be clipped off close. You will then be surprised to find that you have a line that will be as tenacious as any line ever was or

ever will be. One point more. A line such as this if merely coiled around a stick will, if allowed to remain, take on a coiled effect and will be hard to straighten in the water. Therefore wrap it lengthwise on a piece of board a foot or more in length. It will then come out more nearly straight in the water.

FLIES AND FLY MAKING

Tools

If the learner's fingers are delicate and he has good use of them, it is possible to dispense with some of the mechanical appliances used; nevertheless, the most skilful tiers use the simple little instruments illustrated here. The vise, of course, is for holding the hook. It should be



clamped to a table of convenient height or its handle inserted in holes bored for that purpose. There are also special vises built with a clamp for attaching them to a table. The smaller tool is a spring plier, or as some term it, a pair of pliers, for holding the end of a thread or hackle, and conveniently used for wrapping the latter on the hook. The scissors should be fine and of the best quality, such as surgeons use. The picker is simply a darning needle stuck in a cork.

Materials

These, of course, in quantity and variety, will depend much on the angler's wants as to the different flies—few or many—he may wish to produce. A country boy will go to his mother's hen roost and get all the feathers he wants, and by making a slight raid on his sister's work basket for silk and worsted, construct a very effective fly, rough and unkempt though it may be to look at. I will mention nearly all the materials that I use myself and in the order in which they are applied to the hook.

Wrapping Silk

The finer, if strong, the better; and although the color should in some degree correspond to the other material used, this is not of much consequence, as it is only seen in the few slight wrappings at the head of the fly.

Wax

Do not use "cobbler's" wax, as some English writers on this subject call it, but beg or make a little expressly for the purpose. Take one ounce of the clearest and lightest rosin you can procure, one dram of gutta percha, and one teaspoonful of linseed oil—the crude, not the boiled—put them in a teacup (I use the lower part of a discarded tin blacking box), heat them, stirring with a little stick the meanwhile, to have them thoroughly amalgamated, and then pour the hot compound into a bowl of cold water. As soon as it has cooled sufficiently, work and pull it, much as girls pull "taffy"; this makes it light-colored and tough. If the gutta percha cannot be easily obtained it may be omitted, but it adds to the toughness. To make the wax softer for cold weather, add a few drops of oil. To make it harder for warm weather, add, as you require, a little more rosin.

Hooks

There is much difference of opinion as to their proper shape for flies. The point of the barb of the O'Shaughnessy has an outward projection. It is what is called a hollow point, and the chances of hooking the fish are thereby increased. The point of the Kinsey projects inward away from the line of draft, and is therefore

less liable to catch than the Sneck bend, the Aberdeen or the old Kendal. The improved Limerick hooks are of lighter wire—from No. 6 to No. 12—than those for general sale, which I think are too stout, and rather clumsy. The Kirby, the hooking quality of which is superior to all others, if short shanked, may be used for palmers and hackles, but for winged flies the sideward inclination of the point would give the wings of the fly "a list" to one side, and prevent its floating on an "even keel."

Gut

Should be fine for stretcher and stout for drop flies, for the latter using a half length. If the droppers are intended to be looped to the leader, the loops should be tied in each end of the length after soaking the gut, the projecting end pulled tight and cut off close, and then the length divided into two. Gut dyed a neutral tint, between a blue and lead color, is done as follows: Throw your hank of gut into a basin of cold water, and while it is soaking put into a small vessel—tin will answer—a pint and a half of water with 1 dram of ground logwood and 6 grains of copperas. After it has commenced boiling let it bubble 10 minutes longer; then, dashing the water from the gut, throw it in and press it down with a small stick. In 30 seconds or so lift it to see the depth of tint, and continue to examine and immerse it until it suits your fancy. A light tint I consider preferable. Some persons think that the dye affects the strength of the gut. This is not the case unless there is too much copperas; much more than I have prescribed.

Tinsel

Gold or silver, as it is called, but really "Dutch metal," whether round or flat, is kept by variety or military stores, or the country reader can obtain the flat kind from some dealer in Irish linens, as it is frequently used, ornamentally, in putting them up.

Dubbing

The materials, and they are many, of which the bodies of flies are wrapped are, first, and most important, pea-

cock herl, or "harl," as some persons call it—the little plumelets or fibers growing on each side of the tail feathers of the peacock. The copper-colored, for nine flies out of ten, is preferable; the green is used for fancy flies. The next is mohair, or the ravelings of a fabric called "moreen," or pig's wool, growing on certain parts of the animal beneath the bristles, or seal's wool, the most brilliant of all—all of which can be dyed of many colors; or the fur of a rabbit, squirrel, monkey or other animal. Add to these wrapping floss silk, and the list, I believe, is complete.

Hackles

The hackle is intended to represent the legs of a winged fly, or without the wings some imaginary caterpillar insect, which trout take for a reality. There are saddle and neck hackles. The former are the long streamers growing on each side of a cock's rump, the latter are plucked from the back of the neck—the closer to the head the shorter the hackles and stiffer the fibers. Having stouter stems than the saddle hackles, they are less apt to break in winding on. The older the cock the stiffer the fibers; but as old cocks are not always obtainable I avail myself of the good terms I am on with several poultry dealers to pluck the heads and necks of their capons. Natural hackles are more generally used in tying trout flies than others. Then there are those the fibers of which are red at the stem, or say at the roots, and black on the outer edges of the feather, and frequently black at the stem and red at the outer edges; both of which are called furnace hackles. There are also light yellowish red, termed "ginger hackles." Black hackles are essential in tying dark flies. Gray are used in tying dun colored flies when dun hackles, which are very scarce, are not to be had. Add to these the ginger-barred and black-barred on a white ground, and we have most of the natural or undyed colors. The feathers from the wren's tail, from the ruff of the grouse, from the partridge and snipe, and the short spotted feathers of the guinea fowl are occasionally used, but they are soft of fiber and poor substitutes for cock's hackles.

Ornithologists' Terms

Auriculars, ear coverts, soft feathers that cover the ears; *bastard wing,* three or five-feathered, resembling the quills of the true wing, placed on a small bone rising from the wrist joint of the wing; *lesser coverts,* feathers found in successive rows on the wings—those on the inside are termed *under coverts; greater coverts,* large wing feathers lying under the lesser coverts; *primaries,* large quill feathers growing from below the wrist joint; *secondaries* or *second quill feathers* spring from second bone of the wing, appearing when the wing is extended like a continuation of the primaries; *tertiaries* or *third quill feathers* also rise from the second bone, but much nearer the elbow joint; *scapulars* or *shoulder feathers,* soft, downy feathers that cover the shoulder bones; *rump feathers* and *upper tail coverts,* continuations of the covering of the back; *vent feathers* and *under tail coverts,* feathers extending from the arms to the tail underneath; *loral space,* space between the bill and eye; *frons,* the forehead; *occiput,* hind part of head; *flexure,* bend of the wings; *tarsi,* shanks of the legs; *tibia,* thigh; *upper and lower mandibles* or *superior and inferior maxillae,* the upper and lower bills; *iris* (*irides*), colored circle surrounding pupil of the eye; *mentum,* the chin; *guttur,* the throat; *collum,* the neck; *pectus,* the breast.

Wings

The feathers of which the wings of flies are made are numerous. Those of the mallard, teal, redneck, sheldrake, woodduck and other wildfowl correspond in position to the saddle hackles of the cock, and are what ornithologists term "tail coverts." Few others, except the secondary wing feathers of the redneck, canvasback and teal are used. The tail coverts of ducks are difficult of manipulation on account of their extreme delicacy and lightness. Of all feathers from the wings of birds or domestic fowls, the secondary only are good: the pinions are worthless. If a man's arms were wings the pinions would be found growing from the wrist to the tips of the fingers, the secondaries from the elbow to the wrist. The great variety of plumage in domestic fowls produced by crossing and interbreeding has furnished some invaluable

feathers to the fly-maker, especially to the beginner; these are in nearly every case the secondaries of hens. They are much easier of manipulation than the tail coverts of wild ducks or the short-fibered wing feathers of birds, and in all cases should be used instead by the tyro when he can get them near the shade or markings of any duck's feathers he may admire. The Earl Derby, the dark brahmas, and most of the various crossings producing so many shades of brown and mixed colors furnish them. White secondaries are used for the wings of the moth fly or white miller, as also for the coachman. Dun feathers are almost as difficult to procure as dun hackles. Red ibis of course will be seized on, as well as the crest, ruff, back and breast feathers of the golden pheasant. Turkey, the secondary and tertiary, as well as the tail feathers, also come into play; so also do some of the wing feathers of the wild goose. English bluejay, macaw and parrot, and golden pheasant are used almost entirely in tying salmon flies. The guinea hen may also be included.

At the Work Table

When seated at the table where you are to tie your flies, have two paper boxes, each about 16 inches long, 4 deep, and 5 wide. On removing the top, the sides toward you fall by little muslin hinges on the table. The boxes are divided by little pasteboard uprights, each into five apartments of equal width. In the first apartment of the box on the left are bits of feather used for the tails of flies, viz., the tail coverts of mallard, teal, sheldrake and woodduck; feathers from the crest, ruff, back and breast of the golden pheasant, red ibis, parrot, macaw and a few dyed feathers. The second, third and fourth apartments are for the feathers for wings, and the fifth contains hackles. These feathers are neatly folded in slips of paper, and placed in large-sized envelopes, which have the names written at the top of the back. They set edgewise in the box, with the inscriptions all facing the same way, so that by passing the fingers over them you can easily find the feathers you are about to use. The box to the right contains, each in its proper apartment, hooks in little boxes, the size marked on top and bottom, hand vise, spring pliers, picker, wax, a pair of sharp

scissors 3¼ inches long with blades 1 inch long and ¼ inch wide, a small flat piece of India rubber for straightening gut, wrapping silk of various colors and degrees of fineness, floss silk, peacock and ostrich herl, and different kinds of dubbing. Such methodical arrangement, while not necessary, will prevent confusion.

Tying a Hackle

Suppose, first, we tie the simplest hackle, say a ginger

on a No. 6 hook. If you use the vise, fasten the hook between the jaws, then take a piece of wrapping silk of the required length, say a foot or 14 inches, and rolling a mite of wax as large as a BB shot between forefinger and thumb, draw the silk through twice. With the hook in the position shown on the annexed illustration, whether held by the vise or between the thumb and forefinger of the left hand, take five or six turns around the shank of the hook, as shown in Fig. 1. Then, laying on the gut, commence quite close to the head and wrap down to *A*, Fig. 2. Here, with three turns of your wrapping silk, fasten in the floss, *AB*, and laying the wrapping silk along the shank, tuck it in between the gut and the head of the hook, and throw a few loose coils around the gut to keep it out of the way. Now wind on your floss as far as *C*, Fig. 3, increasing the bulk of the body somewhat as you proceed; then throw the loose coils of wrapping silk free from the gut, and take three turns over the floss and clip off the end. You next take your ginger hackle, about the length figured, and stroking back a few fibers at the point and clipping off the end, lay it against the hook and fasten it with four or five turns and wrapping up to within a sixteenth of an inch or so of the head, throw a few loose coils around the gut as before. Now wrap on your hackle closely, pressing back the fibers as you go to avoid overlapping them. On getting as near the head of the hook as shown in the illustration, fasten the hackle with two or three turns, clip off the ends, and throwing the wrapping into coil *D F D*, seize it at *F* and take as many turns as will come to the very end of the shank. Now reversing the turns, with the gut through the coil, you draw on the end *D* until the wrapping forming the coil is drawn tight. Your fly now after clipping off the surplus wrapping is complete, needing only a touch of copal varnish, with a small camel's hair brush at the head to make it secure. The tying of this simple hackle is the all-important rudiment of the art.

A Hackle With Tinsel

Go back to Fig. 2 and suppose *A B* a strip of flat gold tinsel, which you have fastened in with three turns of the wrapping and thrown the latter in a few loose coils around

the gut. Take three turns of the tinsel, perhaps four, or even five if the hook is large, down the shank closely, so as to hide the hook, and then as many turns back, and after fastening with two or three turns of the wrapping, cut off the end of the tinsel. We will vary the body of this hackle by having it of peacock's herl. Take four or five herls between the thumb and finger of the left hand and clip them off evenly, lay them on where you have just clipped off the tinsel, and take two or three turns over the ends which project toward the head of the hook. Now, laying your wrapping silk along the herls, twist both herls and wrapping silk slightly, winding in the meanwhile as far up the shank of the hook as you intend the body to extend, then fastening in the hackle proceed as already described.

Bodies of Other Material

Fur, mohair, pig's wool and seal's wool are spun on in the same way. A raveling of any fabric, for instance moreen, may be fastened and wound on as floss silk. In making a very large body to a fly it is a matter of economy when using floss silk, to wrap first with darning cotton, or similar material. It matters but little as to the color, as the floss covers it. In making a body of mohair, fur, or pig's wool, the requisite quantity, after a little pulling, is placed in the palm of the left hand and rolled into the shape of an oblong cone. The smaller end is then applied to the lower end of the body, and twisting or spinning it in with the wrapping silk, it is wound up the body, which is to be increased in bulk as you near the space intended for the hackle. The wild hairs of the dubbing should be clipped off, so also should awry fibers of the hackle after winding on. The picker (a darning needle, head stuck into a small cork, will answer for this little implement), when required, is brought into requisition in arranging and straightening the irregular fibers after winding on the hackle.

Palmer Hackle

To make a palmer hackle proceed as instructed to *A*, Fig. 2; and after putting on the tinsel, if it is required, fasten in the tip end of the hackle, then the material of

which the body is composed. Now you have tinsel, hackle and dubbing tied in, and the rule is that the material fastened in last is wound on first, so you wind on your dubbing, fasten it at a little below the head of the hook, and then taking three, four or five turns of the tinsel in the same direction, you fasten it also. Now you wind on your hackle just behind and close to the tinsel, and as you get near the head of the hook disregard the tinsel, and take a few close turns of the hackle, fastening it, clipping it off and finishing as already directed. In a palmer the fibers of the hackle should stand out much thicker at the shoulders and head of the fly than along the body.

Tying on the Wings

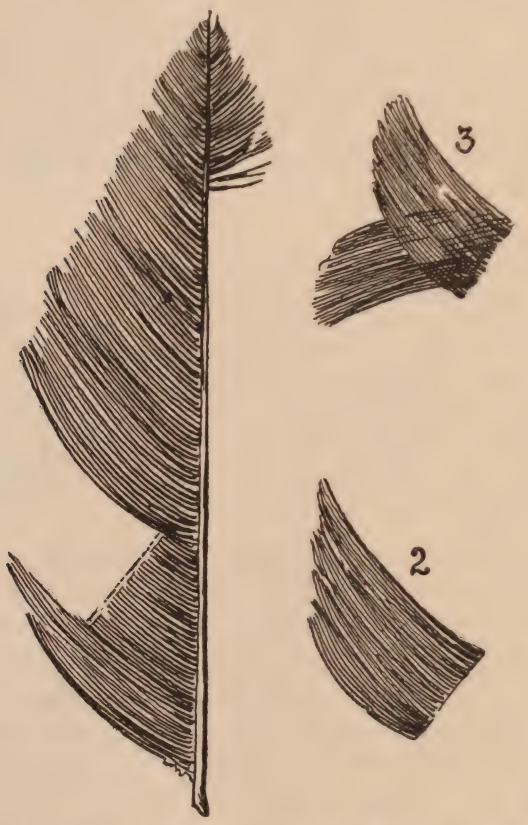
A certain school of fly makers tie on the wings, or more properly the wing, last of all, and in making an elaborate fly it is the proper way, but in ordinary trout flies the wing should be put on immediately after wrapping on the gut. Some old-fashioned makers maintain that a pair of wings should be put on, each one separately. This is certainly unnecessary, for most of the natural flies we observe on the water, if alive, have their wings folded together, appearing as one. Especially is this the case with the *Ephemeridæ*, which are most numerous.

Putting on the Wings (English Method)

If it is the last thing done, holding the smoothly folded mass of fibers together between the thumb and forefinger of your right hand, lay it on the back of the hook, the ends of the fibers extending as far back as you propose to have the length of the wing, pressing it down firmly; then bring the forefinger and thumb of your left hand into action, and releasing the hold with your right, take two or three turns of your wrapping silk; look to see if it sets right, and then with one or two more wrappings, close and neat, you fasten off with the invisible knot, as described in tying the simple hackle, and so your fly is complete.

Making the Wings

From the accompanying cut it will be seen that the fibers incline toward the top end of the feather. Now, each of these, on the sides where they come in contact, if examined with a microscope, will be found to contain



a regular series of little hooks, if I may so call them, forming a connection or interlocking with a similar series on the adjoining fiber. If you cut out a section (Fig. 2),

and doubling it form Fig. 3, the fibers at the outer end of your wing will be of an unequal length and require pinching or clipping off of the ends after it is tied on. You will therefore, holding the stem of the feather in your left hand, stroke back the fibers gently and gradually, forcing the little hooks to lose the original connection with their fellows on the adjoining fibers and form others, until you get them to stand out at right angles with the stem. After forcing as many back as will form your wing, clip them off with your scissors and double them with the under side of the feather inward, and your one wing, representing a pair of wings, is ready to tie on.

Putting on the Wings (the American Method)

Holding the hook as already described, take four or five turns of the wrapping silk about two-thirds of the way up from the bend to the head, then laying on the gut, continue wrapping, but closely, leaving just enough of the hook to fasten and finish off; lay on the wing, the convex edge beneath, and the end in the reverse direction, *i. e.*, outward along the bare gut; then, holding the wing firmly in position, take two or three turns of the wrapping, being careful that the wing does not turn over toward the opposite side of the hook (look at it to see that it sets properly); continue down the shank with a half dozen or more turns, and then clip off the root ends of the fibers, which of course are pointing toward the bend of the hook. Your wing is now secure, with the point or end reversed. Continue wrapping over gut and hook until you come opposite the point of the latter; then put on your tinsel, clipping off the surplus end, then your dubbing, extending it well up toward the head, and leaving the space to be occupied by the hackle about half as much as that so occupied when tying a fly without wings. Here you fasten in the hackle firmly, winding it on up to the point where you commenced tying on the wing; secure the end of the hackle with three turns of your wrapping, clipping off the surplus end, then double back the wing into its intended position, take two or three turns over the head or butt end, and finish off with the invisible knot.

Putting on the Wings (Shorter Method)

A quicker way of putting on the wings is, after stroking back the fibers, and bringing them at right angles to the stem of the feather, to double them into the shape of the wing, and then, with a quick jerk, pluck it by the roots from the stem. The wing is then laid on, and the fly proceeded with as just described. The wing should extend backward just so far that the tip of it comes immediately over the bend of the hook. The fibers of the hackle should hardly be long enough to reach the same place, and the hackle itself should not be more than two-thirds the length of stem required for a hackle or palmer fly.

Facts About Wings

One would suppose, before he tried it, that the wing cut or torn from the stem, as described, would be square at the tip end when tied on. A trial will prove that the end will be oval or elliptical, resembling the wings of a natural fly. The learner, of course, will find that in tying back the wing, if the turns of the wrapping silk are too near the butt end of the head, the wing will set too perpendicularly, and that if the turns of the wrapping are too far back it will set too close to the body. The body in a well proportioned fly extends rather beyond, opposite the point of the hook. If the wing is too long it should be shortened by a vigorous pinch of the thumb nail and forefinger.

Wings With Floss Body

The mode of clipping off the butt ends of the wing close-up to the head of the fly answers in most cases, for instance for a herl, a mohair, or fur body, but when we intend to make a floss body, the surplus part of the wing should be clipped off in a direction slanting toward the bend of the hook; so that in wrapping over it with the floss the body will taper, handsomely increasing in bulk as it nears the place where you intend to fasten in the hackle. In tying flies one becomes appreciative of the minuteness of spaces, and in putting on tinsel, or in the length of the body, or in finishing off at the head as much as may be occupied by one or two turns of the finest wrapping silk is easily judged of.

Tails

In putting on the tail much nicety is to be observed. Of course it is placed precisely on top of the hook, and the fibers of feathers of which it is composed should curve upward and set gracefully. If it be a plain body, as in the fly called the hare's ear, it is tied in on completing the wrapping on of the gut. If tinsel ornaments the end of the body, it should be put on first and then the tail. If the body is intended to be wrapped with tinsel, it should hang loose while putting on the tail, and then wound spirally over the dubbing with two, three, four or five turns, as the case may be.

Fastening and Wrapping

Remember that the material fastened in last is wrapped on first. Suppose, for instance, you wish to make a winged fly with a palmer body. After the tail is on, tie in the end of the hackle, and then—firstly, wrap on the dubbing; secondly, the tinsel; thirdly, the hackle, following closely behind the turns of the tinsel; and it makes a better looking fly to wrap the hackle much more closely on, getting up under the wings, making it a little more "buz," as it is frequently termed. A fly is said to be buz when the hackle is wrapped on thick and it looks "bushy." Some makers use two or three half hitches in finishing off at the head. The invisible knot is as easily tied and much more secure.

Salmon Flies

The cuts of salmon flies given here are copied from "The Book of the Salmon," with the exception of the second. They are introduced to show what are "feelers," and "toppings," and "loops," and "collars," "heads and shoulders," "tags," etc. We scarcely ever use a more elaborate salmon fly than the second for the waters of the Dominion. A salmon fly or one of Whitney's flies tied for the Maine waters, the "toodlebug," for instance, or one of my own mixed wings made for the same waters, unless the river was very high, would scare all the Nipissiquit or Cascapediac or Restigouche salmon out of a pool. A knowledge of the technical names of the minor appurtenances of a salmon fly is not essential to one who plies

his 17-foot withe, or scarcely to one who makes his own flies for American rivers, but to be thorough we must name all the little adjuncts and accessories. The third and fourth flies depicted are much too large for the rivers of Canada at an ordinary stage of water. The third might do on very high water after it has gone down just enough for the fish to commence noticing the fly.

Parts of the Salmon Fly

Examine the third figure. The tail is what is usually called a "topping," *i. e.*, feather from the crest of the golden pheasant. The body is wrapped with floss silk, ribbed with gold twist, *i. e.*, stout gold thread, which is followed by a hackle almost to the head, where, as will be observed, another feather is tied on, a bluejay, for what is termed a "shoulder." There is a mixed wing of golden pheasant neck, teal, guinea hen and light brown turkey, with a topping much longer than the tail surmounting the wing. The head is of black ostrich herl, wound on closely, both for ornament and to hide the butt end of the wing where it is clipped off. Referring to the fourth figure, a "tag" just at the butt of the tail. A tag may be of ostrich herl, or pig's or seal's wool, or floss. The "feelers"—which by a great stretch of imagination are supposed to represent the antennæ of a natural fly—are the two long fibers of macaw tail feather tied in on each side of the head and extending back over the wings; and another stretch of imagination is to suppose that a natural fly carries them thus.

The Nicholson Fly

The second figure is a very plain fly, the "blue and brown," or Nicholson, named after an old salmon fisher, "a broth of a boy," of St. Johns, New Brunswick. There are a few turns of flat gold tinsel, or gold twist, then a tail of mallard and golden pheasant's ruff; the body of reddish brown seal's or pig's wool, wrapped with a blue and reddish brown hackle; the wings are of mallard, and, according to Mr. Nicholson's style of tying, stand well up. The size of the hook given is for high water, when the dubbing and hackles are of lighter shades. As the water falls the hackles and dubbing should be darker. On low

water and bright weather dark brown and purplish blue are best; the hook decreasing in size as the water falls. In fact, trout hooks numbers 3 and 4 (Conroy's O'Shaughnessy's numbers) are, as a general rule, large enough for the rivers of Canada; numbers 1 and 2 are full size for high water.

Materials for Plain Salmon Fly

Take a fly with one hackle, say the "fiery brown." Lay all the materials before you—a short topping for tail, a bit of gold twist (3in. or so), fiery brown dubbing of mohair or pig's or seal's wool, a hackle of redder shade than the dubbing, the wing ready folded, a plumelet of ostrich herl, a bit of blue and yellow macaw tail feather, and a gut loop. The latter is so cut that when doubled it will be long enough to come about where the tail is tied on, the ends to be beveled, and, bending it over a coarse needle or an awl, an eye should be formed, as is not represented in the illustration. The wings of a salmon fly, as a general rule, should be double, or say two-ply, for mallard, of which most wings are made, is very light, and requires delicate handling. In preparing it, stroke back the fibers gently and firmly until all their ends are square, clip off with your scissors, and lay it on the table; prepare another in the same way, and lay it on top of the first, placing it where it is not apt to be disturbed.

Tying the Salmon Fly

Use the small vise. Firstly, secure the hook well between its jaws; secondly, wax your silk, and commencing near the bend, wrap up to the head with a dozen or so turns; thirdly, laying on the gut loop wrap down opposite the bend, perhaps a few turns below; fourthly, lay on the gold twist, secure the end, and winding it three or four turns back, opposite the point of the hook, fasten it, allowing the surplus to stand outward toward the head; fifthly, put on the topping for tail so that it curves handsomely upward and secure it with two turns of the wrapping silk; sixthly, fasten in the tip end of the hackle, the back uppermost; seventhly, having pulled and picked your dubbing and rolled it in the palm of your hand into a conical shape (very little is required), twist in the small end with your

wrapping silk, and spinning both silk and dubbing almost up to the head, fasten with a half hitch; eighthly, twirling your vise, follow with four turns of the gold twist, fasten, and then follow close behind with the hackle, the under side next to the dubbing. You are now ready to put on the wing. There are two ways—one is, after doubling it to tie it on as described; another is, not to double but to lay it flat on the top of the hook with the forefinger and thumb of the right and compress it with the corresponding fingers of the left hand; bending the two edges of the wing so that an equal proportion will enfold the hook on both sides. Now with your wrapping silk take two turns; look to see that the wing is put on evenly and sets properly, and taking a half dozen more turns make it secure with a half hitch. Putting on the feelers to have them set uniformly is a nice job. The pair should be taken from opposite sides of the blue and yellow macaw tail feather; that on the far side to be fastened in with two turns of the wrapping, then that on the near side. In making the head, observe that the black ostrich herl has a convex and concave side, and is to be wrapped on very closely with the convex side outward toward the eye of the loop. Clip off the surplus butt end of the herl and fasten with the invisible knot. With a small sharp stick dipped into copal, varnish the last wrapping of the silk, being careful not to let it touch the herl. When mallard is scarce the under ply of the wing may be of turkey, making it more solid than if it was all mallard. As a rule salmon flies are wrapped, palmer fashion, that is, the hackle over the whole length of the body. The bodies, as will be observed, are very slender in proportion to the size of the fly.

Scissors in Fly Making

Do not put your finger and thumb into the bows or oval openings, but lay that part of the implement in the palm of your hand and with the thumb and fingers work the blades. A little practice in this way will enable one to pick out and clip off a single fiber of the hackle or wing with great nicety.

Grasshopper Fly

Trout do not feed, to any great extent, on flies or other insects when the grasshopper is present in large numbers, for the reason that they swallow such enormous quantities of grasshoppers during the day that when the usual evening rise of flies appears they are full to repletion and do not pay very much attention to the small flies on the surface.

The rivers on which grasshoppers are prevalent, are, from the nature of the surrounding country, not the dashing, rough streams met with in the hills, but generally they consist of a series of large, deep, slow-flowing pools, connected together by short rapids or riffles; consequently there is plenty of room and numerous opportunities to make fairly long casts in reaching the feeding fish, and furthermore these same fish are of a larger average size than the fish that are caught in the rough water nearer the source of the stream.

I designed several variations of the grasshopper fly, until I struck the combination necessary to produce a good imitation of the natural insect. The colors mentioned are taken from the Colour Chart of Société Française des Chrysanthémistes, which has a series of colors ranging from coal black to snow white and is used as a standard by the chrysanthemum growers of France. When describing colors from the chart I also give a popular definition of the color to help those who have not a color chart to refer to. The feathers are in their natural colors unless otherwise specified.

Wings: From the wing feather of a pheasant. These are meant to represent the wing cases of the grasshopper and should be tied on so as to lay down close to the hook, one on each side.

Cheeks: Small cock's hackle points, dyed primrose yellow, shade 2 or a light canary color. The "cheeks" are meant to represent the thigh joints of the grasshopper's legs which are the features that stand out most sharply in contrast with the rest of the insect. They should be

tied at a slightly steeper angle with the hook than with the wings.

Body: A quill-dyed Naples yellow shade 2, or a pale straw-colored quill (p. 29 on color chart).

Body Hackle: The same color as the body, either dyed or from a brassy dun cock. The body hackle is quite short and is put on to assist floatation.

Neck Hackle: A few turns of a medium ginger hackle.

Tail: A few strands from a mallard.

Although this fly is meant to be a dry fly, it should be dressed in the manner that the ordinary wet fly is dressed, *viz.*, with hackles, wings, etc., tied more or less in a vertical plane above and below the shank of the hook, and *not* with the hackles standing out all around. The reason for this is that the fly should float on its side and not "cocked up," because the natural insect, which it is supposed to copy, in nearly every case floats on its side when it has the misfortune to fall on the surface of the water. Of course there is the added advantage that this fly can be used for either wet or dry-fly fishing.

A grasshopper has no tail, but these strands are meant to imitate the lower extremities of the legs of the insect which possibly stick out behind the ends of the wing cases when the grasshopper is in the water. I cannot say with any degree of authority whether or not the tail improves the killing qualities of the fly, but it adds a slightly finished look to the fly and therefore I put it on.

The body hackle was added last year, as I found that with a plain quill body the fly took a great deal of drying to make it float again when once it had gotten wet. But when I adopted the body hackle there was no difficulty in drying the fly.

This fly does not particularly resemble a real grasshopper; but when the fly is floating on its side the combination of feathers and quill have an extraordinary likeness to a grasshopper in a similar position when viewed from above, and as both fly and insect are more or less opaque, I imagine that there is a very similar look about them when regarded from the trout's point of view. The size of hook on which the fly should be dressed should range from No. 10 up to No. 7, which is the largest size advisable to use.

I used this fly exclusively last summer when there was a very heavy fall of grasshoppers on the river I was fishing. I used No. 10 hooks mostly, but I found that sometimes a feeding trout that had refused the small fly several times took a larger fly on the first presentation, but this is not always the case. It is best to use a fly slightly smaller than the average size of the grasshoppers. Another important point to remember is that the body must not be made fat, it should be as slim as possible, if otherwise the fly makes too great a disturbance when being cast onto the still surface of the deep pools.

I find that one application of oil when commencing to fish is generally sufficient to last out the life of the fly. Sometimes when a fly has been very badly mussed up it may be necessary to oil it again.

When a fly is in a very bedraggled condition, before trying to dry it, it is advisable to cast the fly on the water, allow it to sink well below the surface, and then draw it in, by a series of sharp jerks. This removes any slime from the fish's mouth that may have been responsible for the condition of the fly and now it can be dryed again without very much trouble.

R. L. M.

CAMPING AND OUTING

SECTION I.

Wind Indications

When objects at a distance, usually indistinct, loom out clear and distinct, bad weather and changes of wind are coming. Green-colored sky means unsettled bad weather with wind. Wherever the wind is at the vernal equinox (March 21 and thereabouts) there the wind will prevail for the next three months. Crows, before gales, tumble and pitch in the air and croak instead of the usual *"caw."* Red tinged clouds high up at evening are followed by wind.

Fair Weather Indications

If at night there are few stars, and those very bright and sparkling in a pale, steely sky. If swallows fly high. If just before sunrise the sky is dull gray and the sun rises clear, gradually dispersing the vapors. If, after a rainy day, the sunset sky is suffused with a magnificent streak of crimson (not copper color). If there is a rainbow at night. If there are mists at evening over low-lying ground or near a river. If a mist in the morning clears off as the sun gets higher. If there is a heavy dew in the evening. If, after a rain, drops on twigs fall and the branches dry quickly.

Rain Indications

On a fine day if dust suddenly rises in a revolving spiral column. If stars are unusually numerous and the Milky Way very clearly defined, with surrounding sky dark. If there is a misty appearance over the stars. If field sparrows wash vigorously in a puddle. If the woodpecker (usually a silent bird) becomes uneasy and continually cries *"yoo, yoo—yoo, yoo, yoo."* If domestic fowls keep on feeding when rain begins to fall it will continue; if

they run at once to shelter it will be a short shower. If flies are persistently troublesome, look out for thunder as well as rain. If swallows fly close to the ground. If before sunrise the sky is suffused with red (except in frosty weather). If the sun, late in the day, shines through a gray watery haze it will rain during the night. If the sun at setting has a tinted halo around it. If the moon has a halo around it, especially if some distance from it. If there is a rainbow in the morning. If small dark clouds float below lighter ones, moving faster than the latter. If in the morning there are low-hanging, smokelike clouds. If there is no dew in the morning. If after a rain, drops still hang on the twigs instead of immediately drying. Damp stones indicate rain or heat.

Camp Outfit

Go as light as possible. In a camp outfit, be governed by your ability to carry it. I have made a successful and entirely satisfactory expedition with a tin cup and pocket knife. Meat can be broiled on a stick. Flour can be transferred into a dough in the hollow of a clean piece of bark and baked on a flat stone, a chip or a piece of bark, before the fire, but a cup is positively needed for the coffee. Under such circumstances the addition of a frying-pan enables one to revel in positive luxury. In it you fry your meat, bake your bread, and can make your coffee. The tin cup is then superfluous. After the necessities add anything you want and can carry. In provisions, bread, meat and coffee are important, though not indispensable. It is more comfortable to have them, and unless you are a first-rate rustler it is quite essential that you have plenty of something.

Cooking Utensils for Camping

Broiler, camp stove (not necesasry, but handy), can opener, coffee pot, forks, frying-pan, iron pot, knives, pepper box, spoons, tin cups, tin pails, tin plates, water pail.

Provisions for Camping

Bacon, butter, canned goods, coffee, corn meal, crackers, cheese, eggs, flour (self-raising), hard tack or pilot bread,

Mazola, lemons, mustard, oatmeal, onions, pepper, pickles, potatoes, rice, salt, salt pork, sugar, tea, vinegar.

Miscellaneous Articles for Camping

Bandages, belt, blacksmiths' pliers, blankets, candles, cathartic pills, comb, compass, corkscrew, court plaster, fishing tackle, fly repellent, gimlet, guns and equipments, hatchet, Jamaica ginger, kerosene oil, knife, lantern, liquor (for medicine), map, matches, mirror, mosquito net, nails, needles, pins, pipe, postage stamps, rope, salve, saw, scissors, soap, tent, thread, tobacco, tooth brush, towels, twine, writing materials.

Camp Site

Select the highest and dryest spot, put a good fire on the swamp side, and, if possible, let trees intervene. When camping in a tent, dig a trench all around it to catch the rain and carry it away from camp instead of into the tent.

Shelter for the Night

He is a poor woodsman who in a forest of any kind cannot very quickly provide himself with shelter from rain or snow. It may be of palmetto leaves, of branches of trees or of bark from the trunk of a tree. The favoring trunk of a tree may keep off the storm, or in a rocky country a shelter can often be found under a projecting ledge or in a shallow cave. A good thing always to carry along is a rubber poncho for each person. It is good to roll around the bedding when *en route* to protect it from wet and dirt; or to put over one's shoulders when traveling in rain or wet snow. When night comes, if the ground is wet and the heavens dry, spread it under your bed. If the reverse, reverse it. With two small stakes at opposite sides of a bed for two, to support two corners of a poncho, the other two corners being stretched backward and held to the ground by a couple of stones or chunks of wood, a very good shelter is provided for your

heads and shoulders. Then another poncho spread over the blankets to your feet, and you two can sleep blissfully through any ordinary rainy night.

Lodging for the Night

If caught away from camp over night, the quickest and easiest made shelter can be constructed in a few minutes with an axe. A thickly branched evergreen furnishes all the material. Select one with branches very heavy at the roots. Chop nearly through about four feet from the ground, so that when the tree falls it will still rest on the stump. Cut away the under branches, and use for a bed. Other branches may be used to thatch the shelter until it becomes nearly rainproof. There is room for several people under this shelter.

Shed Camp

A water-tight camp may be made of fir boughs, or even hemlock, by making the roof steep, and lapping the boughs on thick, in courses, with the butt up. The form of the framework may be in several ways. I will mention only two: First, cut poles with crotch at upper end, 10 or 12 feet long, say six or eight of them. Stick the top crotches together, and spread the bottoms to any desired diameter —according to the size of your party—in a circle; then commence to spread on the boughs, beginning at the bot-

tom, and carefully and thickly lapping them to the top, leaving a parting between two poles for a door. This is also the Indian method, and is called a wigwam. Second, cut two poles 7 or 8 feet long, with crotch at top. Stick these in the ground, butt down, as far as you wish the length of your camp to be; say, for four men, make your

camp 10 feet long, and more or less according to your number. The two corner stakes being fixed, cut a pole reaching from one to the other for a ridge pole, then cut shorter poles to reach from your ridge pole to the ground, and put them near enough together to hold the covering, be it boughs or bark.

Sleeping Out

When outdoors always sleep on the earth for comfort. Make your bed there as comfortable as time and circumstances will permit. If the ground is cold, or wet, or covered with snow, you must provide some kind of a foundation. It may be of hay, straw, weeds, brush, corn stalks or fence rails, but in any event stick to the ground. Don't roost on a perch like a chicken and get every breath

of air that blows and chills you from every side. Balsam fir boughs make the best bed of all beds; the tips broken off short and laid shingle fashion, bottom side up from head to foot. All the firs, hemlock, juniper, cedar and pine may be substituted in the order named as to choice. Cherry, willow, alder or any such shrubs follow next. If the ground is smooth and dry, and it can generally be so found in this western country, it is plenty good enough. Use only woolen blankets for bedding. Under any circumstances, when camping, try to so provide yourself as to sleep warm, and the nearer you get to the ground the easier that is accomplished.—*W. N. B.*

Sleeping Bag

The quilt, when extended, is nearly heart-shaped, being 7 feet long and 7 feet at the widest part. The small end does not come quite to a point, but an oval end-piece is sewn in. The quilt is made of silk or silesia, stuffed with 2¼ pounds of down, evenly quilted in, the edges being strengthened with a binding of tape. Around the edges are buttons and button-holes, by which the quilt may be converted into a closed bag, in which a man may sleep warmly in the coldest weather. A cover of the same shape is made of fine muslin, coated with boiled oil, and being provided with button-holes, may be buttoned closely, keeping off entirely the dampness of the ground or even rain. The entire weight of the quilt is 4¼ pounds, and of oiled cover 2 pounds 6 ounces, and both may be rolled into a very small bundle for stowage. The amount of covering may be regulated to suit the weather, the camper sleeping with either oiled cover, quilt, or both over him, or if very cold, rolling up in both.

Mosquito-Proof Tent

The top is formed with a light hoop, about 2 feet in diameter, covered with muslin like the head of a drum. Two strong pieces of tape are sewn from side to side of the hoop, crossing each other at right angles, and at the center where they meet is attached a thin rope about 10 feet long. To the muslin at the rim of the hoop is sewn a quantity of coarse cheese-cloth or "tarletan," descending so as to form a bell 6 feet in height and 8 feet in diameter

at the ground. Around the lower edge, at intervals of 2 feet, are small tape loops for pegging out wide when two or three people wish to sit inside. The whole article weighs only about 2 pounds, and can be folded flat so as to go inside a bag when traveling. When required for use the rope at the top is thrown across the branch of a

tree and drawn up just enough to let the lower edge of the cheesecloth or "tarletan" rest on the ground. Danger from fire can be avoided by soaking the screen in a solution of tungstate of sodium.—*J. J. M.*

Camp Spring Bed

Take coarse cloth 6 feet or 7 feet square. Sew the edges together. Place two logs, 10 or 12 inches in diameter, on the ground 7 or 8 feet apart. Cut two poles 10 or 12 feet long; pass them through the cloth and let them rest on the logs. Cut notches in the logs to keep the poles apart and at a sufficient distance to keep the cloth stretched to its fullest width. Stuff the cloth bag with leaves, grass or browse, and you have a soft spring bed.

Head Mosquito Net

Make some tarletan into the shape of a bag, open at both ends, from 15 to 18 inches long and 2 to 2½ feet in circumference. A piece of fine elastic cord is run in the hem at the top to clasp the body of the hat, while a similar cord in the hem at the bottom secures it around the neck. The hat rim keeps it out of the face. If a low-crowned hat is worn the bag may be closed at the upper end.

Mosquito Gauntlets

Sew linen cloth cuffs to the wrists of a pair of gloves, and run an elastic cord in the hem at the top of the cuff to clasp the arm underneath the coat sleeve.

Insect Dope

Simmer together over a slow fire 3 ounces pine tar, 2 ounces castor oil, 1 ounce pennyroyal oil, and bottle for use. Rub it in thoroughly at first, and replenish it on the exposed skin from day to day.—*Nessmuk.*

Mosquito Repellent

Evaporate a piece of gum camphor, one-third the size of an egg, in the tent or room by placing it in a tin vessel and holding it over a candle or other flame, taking care that it does not take fire.

Mosquito Smudge

From the side of a fallen cedar log, dry but not rotten, cut strips of bark about 6 feet long, enough to make a bundle a little larger than two hands can span. From the white inner bark of a growing cedar tree make long, pliable strips, with which bind the dead bark at intervals of 9 inches into a compact mass. Ignite one end of this and leave it to smudge in the tent like a cigar. The smoke is fragrant and agreeable. When the mosquitoes are routed let the smudge remain all night at the tent door and none will enter.

CAMP COOKERY

Section II.

Fire for Cooking

Start it with fine kindling and clean, dry hemlock bark. When you have a bright, even fire from end to end of the space, keep it up with small fagots of the sweetest and most wholesome woods in the forest. These are, in the order named, black birch, hickory, sugar maple, yellow birch and red beech. The sticks should be short and not over 2 inches across. Split wood is better than round. The outdoor range can be made by one man in little more than an hour, and the camper-out who once tries it will never wish to see a "portable camp stove" again.—*Nessmuk.*

Camp-Cooking Range

Two logs 6 feet long and 8 inches thick are laid parallel, but 7 inches apart at one end and only 4 at the other. They are bedded firmly and flattened a little on the inside. On the upper sides the logs are carefully hewed and leveled until pots, pans and kettles will sit firmly and evenly on them. A strong forked stake is driven at each end of the space, and a cross-pole, 2 or 3 inches thick, laid on, for hanging kettles. The broad end of the space is for frying-pans and the potato kettle. The narrow end, for coffee-pots and utensils of lesser diameter. From six to eight dishes can be cooked at the same time. Soups, stews, and beans are to be cooked in closely covered kettles hung from the cross-pole, the bottoms of the kettles reaching within some 2 inches of the logs. With a moderate fire they may be left to simmer for hours without care or attention.—*Nessmuk.*

Camp Stove

A camp stove is wholly unnecessary, but some people will use them. One kind is made with an elliptical base of

sheet iron 12 inches high and 14 long and 7 inches wide. It has no bottom, the fire being built on the ground and the stove set over it as soon as fairly ignited. In front a 5-inch door allows for feeding and draft. The top has a 6-inch hole to receive kettle or pan, and a funnel 12 inches high and 3½ inches in diameter at the rear conducts off the smoke. An improvement upon this is a large sheet-iron cylinder about 10 to 12 inches in diameter and the same in length, open at both ends. Across one end are stretched several stiff wires upon which rest the cooking utensils. At the other end, which is the bottom when used as a stove, an opening about 6 x 7 inches from the bottom edge is cut to serve as a door and draft. At the same end, opposite the door, another small opening is cut to give a draft to the other side. When not used as a stove it is reversed, the wires serving as a bottom enables it to hold all the utensils, plates, etc., as a bucket, a wire handle being fitted to the bottom for that purpose.

Camp Oven

"Dutch" ovens" or bake kettles are used for camp baking where there is a large party. For a small party an oven can be made of two deep tin (sheet-iron is better) basins, one of which has "ears" riveted to its rim, so that when it is placed bottom up on the other the ears will spring over the rim of the second basin, thus making an oven that is not air-tight, allowing gases to escape.

Coffee

Six heaping tablespoonfuls of browned and ground coffee in a pot, and 3 pints of cold water. Bring it to a boil and then set it aside for 5 minutes, when ready to use drip in half a cup of cold water to settle it.

Tea

Bring water to a boil, then put in the tea, a tablespoonful for every cup and one "for the pot." Then let it simmer, but not boil for 5 minutes.—*Seneca.*

Fried Salt Pork (or Bacon)

Slice thin, put in frying-pan with cold water enough to

cover, let it come to a boil and boil two or three minutes; then turn off the water and fry brown on both sides.

Broiling Small Fish

Clean them and fasten them by the head to a slender, flexible, birch branch. Stick the other end of the branch into the ground at an angle that will allow the fish to hang just in front of the fire, where it can get the most heat. Put a piece of pork on the head, so that the pork fat will run down and baste the fish. Turn and watch it carefully that it may be cooked evenly. Serve and eat at once. Beefsteak and mutton chops may be cooked the same way. Of course, the blaze must be clear, and the meat must be at a distance to get the most intense heat without any smoke.

Fried Fish

Small fish may be fried whole, but large ones should be cut up. Have enough pork fat or Mazola bubbling hot in the frying-pan to well cover the fish. Smear the fish well with dry corn meal or flour, or what is better, dip it into a well-beaten egg and then into bread or cracker crumbs, and fry both sides to a clear brown. Sprinkle lightly with pepper and salt just as it is turning brown.—*Seneca.*

Planked Fish

Any "flat" fish may be "planked." Cut off head and tail, split open the back, but do not cut clear through the belly, leaving the fish so that it may be opened wide like a book and tacked on a plank or piece of bark. Tack some thin slices of bacon or pork to the end of the fish that will be uppermost when before the fire. Sharpen one end of the plank and drive it into the ground before a bed of hot coals. Catch the drippings in a tin cup or large spoon and baste the fish continually until it smells so good you can't wait another instant to eat it. It is then done. —*Seneca.*

Clam Chowder

Fry five or six slices of fat pork crisp, and chop to pieces. Sprinkle in the bottom of pot; lay upon them a

stratum of clams, which sprinkle with cayenne or black pepper and salt, and scatter bits of butter over all. Next, have a layer of chopped onions, then one of small crackers split and moistened with warm milk. On them pour a little of the fat left after frying the pork. Next comes a new layer of pork, then one of clams, etc., as before. Proceed until the pot is nearly full, when cover with water and stew slowly—the pot being closely covered—for three-quarters of an hour. Now drain off all the liquor, and then empty the remaining contents into tureen. Return the gravy to the pot, and thicken with flour or finely-rolled crackers; add a glass of claret or sherry, a spoonful of catsup, one of Worcestershire sauce, and boil up, when pour over the chowder.

Stewed Game

Ducks, rabbits, in fact all kinds of game may be stewed. Cut them into small pieces after cleaning, and put into a pot containing enough cold water to a little more than cover them. A minced onion, small pieces of salt pork vegetables, etc., may be added. Season with salt and pepper, cover the pot and let it simmer until the flesh can be easily pierced with a sharp sliver.—*Seneca.*

Roasting Small Game

Squirrels, birds, etc., may be roasted on a stick before fire of piping hot coals. Clean the game, impale it on a stick with a piece of fat pork, or rub well with Mazola and set the stick in the ground before the coals. Turn frequently and baste with the drippings, which should be caught in a cup or large spoon. When a sharp sliver will easily go into the breast they are done. Pigeons, squirrels, hares or rabbits, ducks and grouse should be parboiled before roasting.—*Seneca.*

Pork and Beans

Two quarts of beans to 3 pounds of pork. Pick over the beans at night, wash, and soak in cold water until next morning. If only boiled pork and beans are desired, drain the beans and put them with the pork in the pot, just cover with cold water, set over the fire with the cover on

the pot and boil slowly till the beans are tender, skimming the scum off as it rises. If baked beans are wanted, parboil the pork and cut it into thin slices, then drain the beans and boil as above. Put half of the beans into the bake kettle, then the pork, then the rest of the beans, and pour over them a half-pint boiling water. Bake until the top is crusted brown.—*Seneca.*

One quart Dried Beans.
One medium sized Onion.
Four tablespoons Karo Blue Label.
One and one-half teaspoons Salt.
One-third to ½ cup Mazola.

Wash beans thoroughly and soak over night. Use the same water to boil beans. Cook slowly until barely tender. Put in bean pot, add Mazola, Karo, onion and salt. Bake in a moderate oven until tender.

Vegetables

All vegetables must be carefully looked over, the unripe or decayed parts removed, and then they must be washed in cold water. When to be boiled they should be put in boiling salted water, and if the water has to be replenished before the cooking is complete, boiling water should always be used. Keep the vessel covered, and drain the vegetables as soon as done. Do not let the water boil long before the vegetables are put in. Old and strong vegetables sometimes require boiling in two or more waters. Always cut the largest vegetables, so that all will be of nearly the same size and cook evenly.—*Seneca.*

Time Table for Cooking Vegetables

Potatoes, old, boiled 30 min.; potatoes, new, baked 45 min.; potatoes, new, boiled 20 min.; sweet potatoes boiled, 45 min.; sweet potatoes baked, 1 hr.; squash boiled, 25 min.; squash baked, 45 min.; shell beans boiled, 1 hr.; green peas boiled, 20 to 40 min.; string beans boiled, 1 to 2 hrs.; green corn, 25 min. to 1 hr.; asparagus, 15 to 30 min.; spinach, 1 to 2 hrs.; tomatoes, fresh, 1 hr.; tomatoes, canned, 30 minutes; cabbage, 20 minutes; cauliflower,

1 to 2 hrs.; dandelions, 2 to 3 hrs.; beet greens, 1 hr.; onions, 1 to 2 hrs.; beets, 1 to 5 hrs.; turnips, white, 45 min. to 1 hr.; turnips, yellow, 1½ to 2 hrs.; parsnips, 1 to 2 hrs.; carrots, 1 to 2 hrs. If a piece of lean salt pork is boiled with some of the above, they will be sufficiently seasoned. If not, season with salt, pepper and butter.—*Seneca.*

Roast Potatoes

Scoop out a hole among the ashes at the edge of the fire, fill it with coals and keep it hot for half an hour. Then clean out the coals, put in potatoes and cover them over with hot ashes with a brisk fire on top. In 40 minutes try to stick a sliver into them. If it goes in easily they are done.

Cornmeal Mush

To avoid lumps mix the meal first with enough cold water to make a thin batter and then pour this batter into the pot of boiling water (slightly salted) very gradually, so as not to stop the boiling process. Stir it in and boil (constantly stirring) until it will hang well together when taken out with a spoon. When it is cold it is excellent fried in boiling pork fat or Mazola.—*Seneca.*

Johnnycake

Make a thick batter by mixing warm (not scalding) water or milk with one pint of cornmeal, and mix in with this a small teaspoonful of salt and a tablespoonful of melted lard. Grease the bake tins thoroughly with Mazola or butter, set the batter in one, cover over with the other, and bury the oven among the hot coals, heaping them around it, so as to have an equal heat on all sides. In 30 minutes it should be done.—*Seneca.*

Slapjacks

The frying-pan must be perfectly clean and smooth inside. Scrape it after each panful is cooked and then only occasional greasing will be required, which is best done with a clean rag wrapped around a piece of butter or with Mazola. The batter should be very thin and disturbed as little as possible. When it is cooked firmly on one side,

turn it. Johnnycake batter thinned down will make slapjacks, or wheat flour batter prepared the same way.

Maryland Biscuit

Take one quart of flour, ¾ tablespoonful of Mazola, one teaspoonful of salt, enough water—or half water and half milk, if you can get it—to make a stiff dough. Mix thoroughly, and then beat with an axe or club for half an hour, or until the dough becomes light and elastic. Any smooth, thick board, or a smooth stump or log, will answer to beat the dough on. Then mould the dough with the hands or cut with a tin box lid into biscuits ½ inch thick and 2 inches across. Puncture the top of each biscuit several times with a fork and put them in a Dutch oven and bake with a moderately hot fire, as any other bread should be baked in camp.

CAMP AND TRAIL FIRST AID

Get a Doctor

The hints in this chapter are designed to indicate such treatment as can be applied to relieve a sufferer when in the field or camp *until the doctor comes.* Where there is any serious injury or illness, get a doctor as soon as possible.

Empty Stomach

Never start out hunting or tramping on an empty stomach. Eat something first, or at least drink a cup of coffee.

Emetic

Frequent drafts of warm water, ground mustard and water, are all readily obtainable emetics. The last one is the surest. Mix a teaspoonful of ground mustard in a cup of water, give two or three drinks of it and follow up with twice the quantity of warm water.

Sunburn

After having been exposed all day to the sun, do not wash the face at night, but wait until the next morning.

Chapped Hands

Bathe in diluted vinegar, well rubbed in.

Blistered Feet

Coat the inside of your socks (woolen are best) from ankles downward with common yellow bar soap, repeating the application for two or three days. Good either as preventive or remedy.

Diarrhoea

Mix and drink a tablespoonful of wheat flour in a tumbler of cold water.

Bleeding from the Nose

Check by applying cold water to face and neck, and

holding a sponge soaked in cold water to the nostrils. Keep the head well back and do not blow the nose.

Poisoning from Poison Ivy

Bathe in a strong lye made from wood ashes, or rub on the dry wood ashes alone.

Take one pint bark of black-spotted alder, and one quart water. Boil down to one pint. Wash the poisoned part repeatedly.

Poisoning from Poison Sumach

Apply strong salt and water, "as strong as can be made," to the affected parts.

How to Improvise Sterile Dressings

Take an ordinary clean white linen handkerchief and place it in boiling water for twenty minutes. At the same time permit an ordinary table fork to remain twenty minutes in the boiling water. Without permitting anything to touch the handkerchief, hands included, except your sterile fork, pick up the handkerchief and dip it in a solution made up of two quarts of boiled water and one bichloride tablet. Hold up by fork until water runs off, leaving handkerchief damp, and then place it over wound by means of fork. Bandage with strips of cloth from your shirt or a sheet.

First Aid—What to Take

Be sure you have some cathartic pills, antiseptic dressings and a generous bottle of iodine, a few bichloride tablets, marked "poison." In addition, carry some iodine crystals in a commercial hermetically sealed tube, for if you break your bottle of iodine you can make some more by the addition of water. If you are to hunt in a snake country, by all means take along a vial of permanganate of potash crystals and carry them in your pocket. Add to the above anything your experience or special needs call for.

Bites and Stings of Insects

Apply ammonia, soda or wood ashes. The sting, if left in the wound, should be extracted. The bites of the

tarantula and centipede, and the sting of the scorpion are painful, but seldom, if ever, fatal.

Snake Bite

Prompt action is required in the case of a person bitten by a snake. Especially is this true in the case of the rattlesnake and copperhead. If the wound is in an arm or leg, immediately put on a tourniquet, that is, tie a handkerchief or bandage around the limb between the wound and the heart and twist it tight so that the blood is prevented from circulating. This tourniquet must not be used for more than thirty minutes at a time. Cut through the teethmarks and suck out as much poison as possible. Bathe wound in a 2 per cent. solution of permanganate of potash. If no permanganate is available, cauterize the bite with a lighted match, a hot coal or a little gunpowder rubbed in and ignited. If stimulants are available give freely, but not to the point of intoxication. Apply a wet antiseptic dressing to the bite and have patient remain quiet. In the absence of water apply permanganate of potash crystals to wound after it has been incised and has bled freely.

Unconscious from Injury

Put the victim on his back and loosen the clothing. Administer hot brandy or whiskey and water, a teaspoonful a minute, for ten minutes. If he remains unconscious, apply hot cloths or a hot stone wrapped in cloth to the feet, armpits and pit of the stomach.

Sunstroke

This results partially from debility. Its first symptoms are violent pain in the head, pain and weight in the pit of the stomach, disordered vision and difficulty of breathing. When insensibility follows, take the victim to a cool, shady place, put him on his back, with his head slightly raised, loosen the clothing and douse with cold water upon face and chest.

Cramps

Endeavor to straighten the limb, apply warm water and rub vigorously with the hand. If cramped while bathing

make a sudden energetic effort to extend the muscles which are cramped.

Bruises

Apply cold water, or weak arnica and water.

Burns

If your clothes take fire, roll over and over as fast as possible on the ground or floor to extinguish the fire. If your wife's clothes take fire, throw her down and wrap your coat or a blanket around her, tucking it around her neck to prevent inhalation of flame. After smothering the flame douse her with water before smouldering embers eat into the flesh. If severely burned, cut off the clothing by cuts up and down so it will fall off. Don't pull it off, for the skin will come with it. If clothing sticks to the flesh in some places, let it stick. Apply antiseptic bandage dipped into any kind of oil, and place them upon the burned parts. If you have no cloths, anoint with any kind of clean grease, butter, lard, etc.

Scalds

Drench the victim at once with cold water, and then proceed as for burns.

Frost Bite

Keep out of a warm room, remove clothing carefully, rub the frozen part with snow, or with ice water and wet cloths. Keep rubbing until circulation is thoroughly restored before the warm cloths are applied or a warm room is entered. Get a doctor, as mortification may follow.

Wounds

Lessen the bleeding as much as possible. If in hand or arm, hold above the head; if in leg or foot, lie upon the back and hold up the leg above the body. If the blood is bright red and comes in spurts, an artery is injured, and you must check the flow by pressure upon the artery

between the wound and the heart. Wind cloth (your suspenders, if elastic, are better) tightly around the limb, one layer above the other, the bandage pressing the artery firmly. If the hemorrhage is severe, make a tourniquet by putting a stick under the bandage and twisting it tight

until the bleeding stops. Let the doctor dress the wound when he comes, but meantime cover it with an antiseptic bandage. Whatever you do, do not permit anything to touch the open wound but the antiseptic bandage. Before bandaging paint all wounds with iodine.

Wounded Hand

If a finger, press upon both sides above the wound; if the hand, press the artery in the wrist where the pulse is usually felt.

Wounded Arm

Press the inner side of the upper arm, or bandage a block of wood under the arm very tightly.

Wounded Foot or Leg

Check bleeding by bandage over the large artery on inner side of the thigh. Use the tourniquet or stick to twist the bandage tight.

Wounded Head or Face

Press over the artery at the front side and base of the neck just above the collarbone.

Wound from Fish Fin

One spoonful each of common salt and gunpowder and the white of an egg, mixed into a paste and applied to the wound; bandage as in other wounds. As mixture becomes dry, apply fresh until all poison is extracted. Keep the paste moist by covering with damp cloth.

Broken Limbs

When a bone is broken, the victim will not be able to raise the limb; it will be bent or shortened; and if an attempt be made to move it, it will bend where it ought not to. Keep the sufferer perfectly quiet and as comfortable as possible. To obtain as perfect rest as possible for the limb until the doctor comes, fasten it to some support. Splints may be made of sticks, laths, stiff cardboard, cigar boxes, etc. To make them conform to the shape of the limb, wind them thickly with strips of cloth, pieces of blankets, clothing, etc. On the splints place a padding of grass, straw or cotton wool, to prevent chafing. Cover the pads with cloth. Fasten splints to the limb by pieces of cloth, suspenders, handkerchiefs, etc.

Broken Upper Arm

Make four splints, reaching from shoulder to elbow, pad well, and place one in front of the arm, the longest one behind, and one on each side. Bandage, and put forearm in a sling.

Broken Forearm

Use two splints from elbow to the finger tips, one on the palm side of the hand and one on the back of the hand. Put the forearm in a sling across the body with palm inward.

Broken Thigh

Instead of splints, bind both legs firmly together.

Broken Leg

If the tibia is fractured it will show by the displacement under the skin at the front of the leg. Make a splint to reach from knee to bottom of foot. If the fibula (the

bone concealed by the calf) is broken, bandage from the knee down, and the tibia will act as a splint.

Broken Collar Bone

This fracture is indicated by an unusual projection on one side, with a drooping forward of that shoulder and pain in the region. Find a piece of log 2 or 3 inches thick and 6 inches long, and wrap cloth around it until you have a pad 4 inches thick. Place this under the arm next the fractured bone and bind the arm perpendicularly to the side by a bandage around the body.

Broken Ribs

Fracture of one or more ribs is indicated by pain in the affected side when taking a full breath. Overlap the undercoat as tightly as possible and pin or tie it tightly around the body. Let the sufferer lie on the affected side and get a doctor quickly.

Restoring the Apparently Drowned

Being under water for four or five minutes is generally fatal, but an effort to revive the apparently drowned should always be made, unless it is known that the body

Fig. 1

has been under water for a very long time. The attempt to revive the patient should not be delayed for the purpose of removing his clothes or placing him in the ambulance.

Begin the procedure as soon as he is out of the water, on the shore or in the boat. The first and most important thing is to start artificial respiration without delay.

The Schaefer method is preferred because it can be carried out by one person without assistance, and because its procedure is not exhausting to the operator, thus permitting him, if required, to continue it for one or two hours. Where it is known that a person has been under water for but a few minutes, continue the artificial respiration for at least one and a half to two hours before considering the case hopeless. Once the patient has begun to breathe, watch carefully to see that he does not stop again. Should the breathing be very faint, or should he stop breathing, assist him again with artificial respiration. After he starts breathing do not lift him, nor permit him to stand until the breathing has become full and regular.

As soon as the patient is removed from the water, turn him face to the ground, clasp your hands under his waist, and raise the body so that any water may drain out of the air passages while the head remains low. (Figure 1.)

The operator kneels, straddles one or both of the patient's thighs, and faces his head. Locating the lowest rib, the operator, with his thumbs nearly parallel to his fingers, places his hands so that the little finger curls over the twelfth rib. If the hands are on the pelvic bones, the object of the work is defeated; hence the bones of the pelvis are first located in order to avoid them. The hand must be free from the pelvis and resting on the lowest rib. By operating on the bare back it is easier to locate the lower ribs and avoid the pelvis. The nearer the ends of the ribs the hands are placed without sliding off the better. The hands are thus removed from the spine, the fingers being nearly out of sight.

The fingers help some, but the chief pressure is exerted by the heels (thenar and hypothenar eminences) of the hands, with the weight coming straight from the shoulders. It is a waste of energy to bend the arms at the elbows and shove in from the sides, because the muscles of the back are stronger than the muscles of the arms.

The operator's arms are held straight, and his weight is brought from his shoulders by bringing his body and shoulders forward. This weight is gradually increased

until at the end of the three seconds of vertical pressure upon the lower ribs of the patient the force is felt to be heavy enough to compress the parts; then the weight is suddenly removed; if there is danger of not returning the hands to the right position again they can remain lightly in place, but it is usually better to remove the hands entirely. If the operator is light, and the patient is heavy, the operator can utilize over 80 per cent. of his weight by raising his knees from the ground, and supporting himself entirely on his toes and the heels of his hands—the latter properly placed on the ends of the floating ribs of the patient. In this manner he can work as effectively as a heavy man.

A light feather or a piece of absorbent cotton drawn out thin and held near the nose by some one will indicate

Fig. 2

by its movements whether or not there is a current of air going and coming with each forced expiration and spontaneous inspiration.

The rate of operation is 12 to 15 times per minute, and should not exceed this; the lungs must be thoroughly emptied by three seconds of pressure, then refilling takes

care of itself. Pressure and release of pressure—one complete respiration—occupies about five seconds. If the operator is alone he can be guided in each act by his own deep, regular respiration, or by counting, or by his watch lying by his side; if comrades are present, he can be advised by them.

The duration of the efforts at artificial respiration should ordinarily exceed an hour; indefinitely longer if there are any evidences of returning animation, by way of breathing, speaking, or movements. There are liable to be evidences of life within 25 minutes in patients who will recover from electric shock, but where there is doubt the patient should have the benefit of the doubt. In drowning, especially, recoveries are on record after two hours or more of unconsciousness; hence, the Schaefer method, being easy of operation, is more likely to be persisted in.

Aromatic spirits of ammonia may be poured on a handkerchief and held continuously within 3 inches of the face and nose; if other ammonia preparations are used, they should be diluted or held farther away. Try it on your own nose first.

When the operator is a heavy man, it is necessary to caution him not to bring force too violently upon the ribs, as one of them might be broken.

Do not attempt to give liquids of any kind to the patient while unconscious. Apply warm blankets and hot-water bottles as soon as they can be obtained.

The Schaefer method of artificial respiration is also applicable in cases of electric shock, asphyxiation by gas, and of failure of respiration following concussion of the brain.

NESSMUK HINTS

SECTION III

Rubber Cement

Pure India rubber 4 ounces, powdered asphaltum ⅛ ounce. Put in a tin can and add six times the amount of benzine. Let it stand three or four days, then work it with a stick and add benzine, stirring well until it is of the consistency of honey. It should always be covered, except when stirring. To use it scrape the polish from the rubber, then apply the cement to both patch and boat or garment. Dry one-half hour, then apply another coat and press on the patch. Keep it away from the fire, it is explosive.

One-half pound bisulph. of carbon, three handfuls of gutta percha; put in a wide-mouthed bottle; shake frequently; at the end of two weeks strain through a cloth, return to bottle and cork tightly, for reasons that will be obvious. To apply, first dry the article, then smear the cement on and allow it to evaporate before bringing edges together. After it has become light-colored in spots, warm and bring edges perfectly together; stand away for a while and the job is complete.—*Joseph C. Grubb.*

Mildewed Tents

To remove mildew, whitewash the tent with a weak solution of chlorine of lime. Add salt to make it stick. A strong solution will rot the cloth. Two pounds of slacked lime to a barrel of soft water is the right proportion.

Protecting Canvas

Because treatments designed to protect canvas against moisture and mildew do not, as a rule, prevent the injurious effects of sunlight on the fibre, the Bureau of Chemistry of the United States Department of Agriculture tried out the usual waterproofing mixtures with the

addition of other substances for protection against sunlight and found that earth pigments, such as are commonly used in paints, are effective. The protection consists in conserving the strength of the fabric and undoubtedly this results in keeping out the light.

Since several pigments are suitable, there is more or less freedom of choice as to color. For a buff to khaki color, use yellow ochre; for a darker buff or light brown, use raw sienna; for dark red or reddish brown, use burnt sienna; for olive brown, use raw umber; and for a dark brown, use burnt umber.

The formulas for waterproofing canvas may be used with the addition of one of the earth pigments, using one pound, either dry or ground in linseed oil, to each gallon of the prepared solution. Or one of the following formulas may be used instead:

Formula I

Dark or yellow petrolatum.....8½ pounds
Beeswax .....1½ pounds
Gasoline .....3 gallons
Kerosene .....2 gallons
Earth pigment (dry or ground in linseed oil), to each gallon of prepared solution.....1 pound

Formula II

Asphalt (petroleum or Bermudez).....7½ pounds
Dark or yellow petrolatum (vaseline).....2½ pounds
Gasoline .....3 gallons
Kerosene .....2 gallons
Earth pigment (dry or ground in linseed oil), to each gallon of prepared solution.....1 pound

The quantities given in the two formulas are sufficient for treating about 40 square yards of canvas when brushed on one side and can be increased or decreased in proportion as required. Canvas treated with Mixture II will probably be somewhat more water-resistant than if treated with Mixture I, but it will also be darker because of the asphalt. Since asphalt is usually cheaper, especially when used in large amounts, this formula may be preferred.

For canvas that remains in a fixed position, as, for instance, permanent wagon covers, boiled linseed oil containing 1 pound of pigment to the gallon can be used. This treatment stiffens the canvas and is, therefore, not suitable for covers that are frequently folded. Lamp black was found to be one of the best protective pigments for use with linseed oil, giving the most flexible coating. Aluminum bronzing powder and, for a white color, zinc oxide are also good, but the latter stiffens the canvas more than any of the other pigments tried.

Waterproofing Tents

Dissolve one-half pound of sugar of lead and powdered alum in a bucket of rain water, and pour the solution into a large tub. Soak your tent for twenty-four hours, and then hang it up to dry instead of wringing it dry. Rain will hang to it in globules, but won't go through the cloth. It will also prevent mildew.

Waterproofing Linen

Take a solution of sulphate of alumina in ten times its weight of water, and a soap bath of the following composition: One part of light colored resin and one part of crystallized soda (sal soda) and boiled in ten parts of water until dissolved. The resin soap is precipitated with half part of table salt, and is subsequently dissolved along with one part of white curd soap in thirty parts of hot water. It should be put in wooden tubs for use. On made-up articles the two solutions can be applied with a brush and then rinsed off.

Waterproof for Leather

Melt together one pound tallow, ½ ounce neatsfoot oil, 1 ounce resin, ½ ounce lampblack and 1 tablespoonful linseed oil.

Waterproof for Boots

Melt together 6 ounces mutton suet, 6 ounces beeswax and 4 ounces resin, and add 1 pint linseed oil.

Waterproof for Cordage Fabrics

Take of pulverized potash, alum and crushed acetate of lead, each 20 parts, bicarbonate of potassium and Glauber's salt, each 12 parts, and pour over this mixture 3,000 parts of soft water, all by weight. Also dissolve separately in an equal quantity of water 9 parts of oleine soap, and then mix both solutions. The articles are left in this solution until thoroughly saturated, allowed to drain, dried, brushed, and finally pressed. For linen, leather and wood, add margarine, 6 parts, and for cotton or paper some gelatine, 3 parts, and resin, 6 parts. Impregnation with this preparation, it is claimed, does not injure the colors. Alum and sugar of lead alone, or alum and caoutchouc, can be used for the same purpose.

Waterproof Bags

Make them of unbleached muslin, sewn in a lap seam, with a double row of stitches. When sewn they are dipped in water and slightly shaken to remove the drops, and then, while wet, a mixture of equal parts of boiled oil, raw oil and turpentine is applied to the outside with a brush. This takes a week to become thoroughly dry, and then another coat is put on without dampening the cloth, and if a little liquid drier is added to the mixture this coat will dry in four or five days. They can be made in all sizes, being closed at the mouth with a draw-string, and are excellent receptacles for various articles of food, sugar, coffee, bread, etc., and for clothing and blankets.

Handy Tool

Have a pair of blacksmith's pliers 12 to 18 inches long. It is a good poker for the fire, a gripper for the handleless frying-pan and hot dishes of all kinds, can be used as a hammer, a wrench, and for many other purposes.

Compass in the Woods

Never go into the woods without a compass. The story books say moss is only found on the north side of trees, and that's where the moss doesn't grow. The north side of a tree trunk is light and the south side dark. These indications are not as reliable as a good compass.

Fire Lighting With a Gun

Take a bit of rag, the cloth lining from a hat, coat, etc. Rub powder into it well, then load it into your gun or cartridge shell. Fire it among dry leaves, and have some small dry slivers of wood ready to catch the blaze before it ceases to glow.

Stiff Boots

To prevent wet boots from becoming stiff, rub them with a good dressing of castor oil just before they are thoroughly dry. To soften stiff boots, soak them in water and treat as above. Never put wet boots near a fire to dry; they should be dried slowly.

Fire Bed

If you have to sleep on the ground on your over-night hikes, there is no need of being uncomfortable from the cold. Make an Indian fire bed. Scoop a hollow in the ground about eight or ten inches deep and somewhat larger than the body, being careful to bank the loose dirt at the sides. Then build a fire, covering the whole bottom of the hollow. After the fire has completely warmed the ground, remove the large sticks but leave the embers and coals. Scrape the loose dirt, which was banked along the sides so that it, too, would be heated, down over the embers. Be sure they are all well covered with the dirt. Crawl into the hollow, pull your blanket up over you and you will not stand the least chance of being chilled. This method of heating your bed is excellent for use in the mountains where even summer nights are apt to be uncomfortably cool.

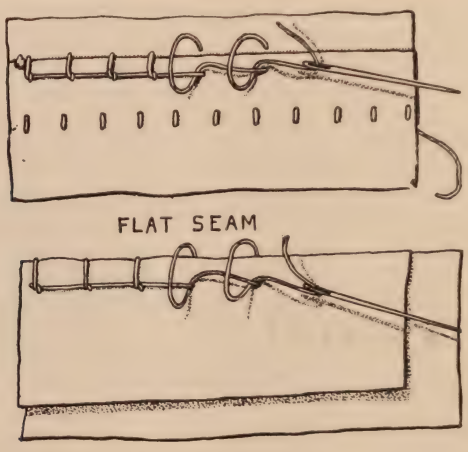
Trench Candles

Trench candles are made by rolling newspapers into a compact roll about an inch in diameter, secured by pasting along the edge of the last sheet. This roll is then cut into pieces about an inch and a half long, which are boiled in paraffine for about five minutes. After cooling these candles are firm and hard and for use are stood on end and lighted.

Now for the proof of their practical utility. On one occasion my companion and I cooked bacon and eggs, using only part of a candle; at another test, soup for three was prepared without exhausting the fuel. As a result of these and many other experiments my outfit always contains these handy articles, and I consider myself prepared for warm noon lunches and fires on rainy days.

Ferguson Stitch

There are some who prefer to make and sew their own tents, but who have had trouble in making the seams tight. It is hard to beat machine work, but sometimes a machine is not available, and then there is the same feeling about a tent made by hand, if it is one's own hand, that there is about anything else that is rare



and hand-made. A tent must comfortably protect the camper and his necessaries, but all extra inches over the required dimensions should be discarded.

Many moments of pleasure can be enjoyed in laying

the foundation of a camping trip. One time of pleasure is that spent in making just exactly the tent you need, according to dimensions which you have evolved and tested on trails—one of correct dimensions and weight, that will withstand all of Nature's elements and the maker's egotism in telling about it.

Here is a stitch that will stand the test of wear, either on a flat seam or on an edge. For the flat seam let one edge slip by the other about one-half inch, hold the needle at right angles to the seam and insert, taking in a raw edge and making a short stitch on the other side, as shown; draw thread up through the knot for first stitch, but when succeeding stitches are taken draw thread over and under the thread that lies parallel to the seam. Study the diagram and you will catch the trick. On an edge seam the two edges are placed evenly together and the stitch taken over both edges instead of through to the back. Tools needed are knife, darning needle, or triangular sailmaker's needle, ball of 3-cord flax, piece shoemaker's wax and beeswax.

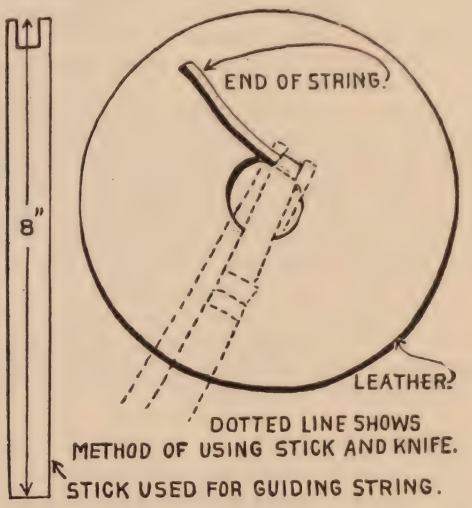
Leather String

As a rule, leather strings are stronger when cut from the leather, parallel with the backbone, but strings of greater length and of great durability can be cut spirally from scraps of leather.

In one edge of a stick of convenient size, say one inch by one-half, and eight inches long, cut a rectangular notch as wide as the thickness of the leather to be cut, and about one-half inch deep. In the center of the piece of leather cut a circle an inch in diameter, and carry the cut spirally outward to a sufficient extent to make an inch of string of the required size. Then thrust the end of the stick through the hole thus made, and press the string down against the bottom of the notch. Now press the blade of the knife into the wood, across the notch, and close against the edge of the string. Grip the stick and the knife-handle in the right hand, and pull the string with the left. The result will be more string.

The notch should be wide enough that the leather will pass through it freely, but not wide enough that the leather will tilt or crimp.

A string so cut will be somewhat "curly" at first, but a little use, or soaking and stretching, will soon take the kink out of it.



Lantern Crane

For use in camp or tent, a good lamp bracket can be made out of forked branches, as shown in the illustration. Care should be taken in the selection of material. Branches with tough bark are safest, as the greater part of the weight comes on the bark. Cedar is good, also hemlock. After cutting the forked stick of the required shape and dimensions for the place where it is intended, trim it to represent Fig. 1 in the illustration. The long strip of bark which is left attached to one end of the fork is whipped back and tightly secured to the fork with wire or cord as in Fig. 2. This contrivance is especially handy for a tent pole, as the arm can be made as long or as short as desired according where the light is to fall.

Fig. 1

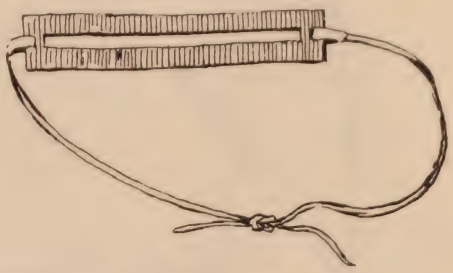
Fig 2

To Protect Against Snow Blindness

The Esquimaux of the far north guard against snow-blindness. Construct a glare shield as follows: procure two small pieces of wood and fit them together so there will be only a narrow slit between. These may be placed over the eyes like spectacles and fastened with a deerskin thong (a common cord will do) behind the head. The range of vision will then be very narrow, but all the glare will be shut out. Details are shown in the rough sketch below.

The Esquimaux and Indians also are accustomed to darken the skin all about the eyes with soot. This miti-

gates the glare of the wide, white snow fields, and is a good hint to remember in case glare shields are forgotten. If anyone has had a touch of snow blindness,



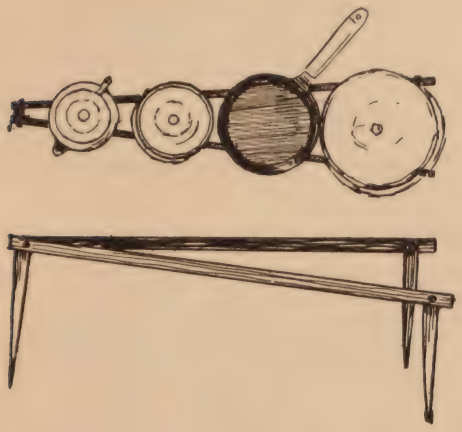
he will know that it is a danger to be dreaded and guarded against.

Camping Stove

I am sending you a drawing of a camp stove which is as light as any you can find. I have used this stove a great deal and have found it very satisfactory. Besides being light in weight it folds into a very small space and can be put under the rear seat of an automobile, in the tool box, on running-board or, in fact, almost anywhere. The size of the stove depends entirely upon the size of the party it must cook for. You will generally know whether your party averages two, four or six, and can judge the size accordingly. Do not make the legs too long. You do not need a big fire to cook with. If you are cold, build a bonfire and take some of the coals to a spot a little distant and out of the smoke and there set up your cooking stove.

My stove cost twenty cents and was made by a country blacksmith in a few minutes. He used three legs of ¼″ x ⅞″ iron, pointed at one end to drive in ground; two horizontal bars of ¼″ x ⅞″ iron drilled at each end to take ¼″ stove bolts; top of legs were also drilled to take same bolts. Bolt one leg between the two horizontals with a bolt 2″ long so as to allow some play. Bolt a leg

to each of the other two ends of the horizontals. The top of the stove, as shown in the cut, shows how it is used. My stove is only 28" long as I seldom use it for more than two people, but three feet is a good length for



general use. The legs fold up and horizontals swing together when closed, making a package ¾" x ⅞" x 3 ft. which can be accommodated in automobile, canoe, or motor sidecar.

Combination Scoop and Strainer

A convenient form of strainer which will remind one that he is enjoying nature is here described. Cut a forked sapling branch, peel it, and then bend the forked ends into a loop and tie together. Then cut a round piece of cloth—preferably cheesecloth—and sew or tie it around frame, and you have a serviceable strainer. A fine scoop can also be made on the same pattern. Bend the fork around a tin or aluminum cup and tie ends. The cup can be removed when desired, the handle keeping it from falling through when inserted again.

Cup With Open Handle

For those who have not attained the "art" of camp dishwashing, this will prove useful. To remove the grease and dirt from forks and knives, sticking them repeatedly in the ground will thoroughly cleanse them. Old Nessmuk himself believed in this trick and practiced it. To scour doughy pots and greasy pans, fill about quarter full of gravel and water and shake them thoroughly. Gravel from the bed of a stream usually fills the bill.

If you have not the open handle style cup, you can easily make one by filing the lo v portion of the handle until it is free from the body of the cup, then slightly bending it outward. This style cup nests very well when packing.

Solid Bed of Coals

Campers all state that cooking should be done over a "solid bed of coals," but unless you know this little kink it is not so easy to get the coals just where you want them. When making the fire on which to broil some of those little brook trout which you have just taken off the hook, this is the way to manage. Place two short logs of even height where you want your fire, then place an even layer of green hardwood sticks about the size of your wrist between the logs. The logs must not be farther apart than the size of your camp grid allows. Then build your fire on top of the green hardwood sticks and start to clean your trout. By the time you have them ready for the pan, all rolled nicely in corn meal—if you wish to fry them—or neatly scored through the backbone in several places, so they will not curl, and strips of bacon pinned to them with hardwood pins—if you wish to broil them—the sticks will have turned into the solid bed of coals so much talked about and so seldom achieved.

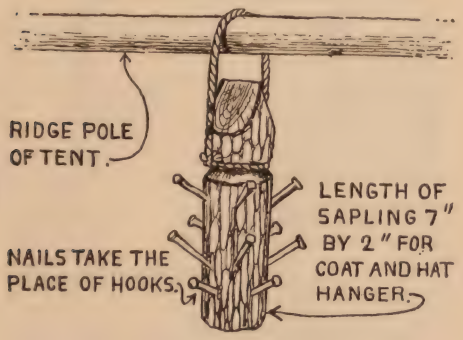
Game Carrier

To make a game carrier at no expense and very little labor, take a strip of harness leather long enough to go over your shoulders (about 27 inches), sew ends of strong belt leather. These slit carefully into fringe-like sections and then make a slit in each section; this slit holds the

bird. The carrier can be made to accommodate from ten to fourteen birds. A carrier from a discarded army web belt, is as good or better than leather for a shoulder strap. This carrier can be used for rabbits, squirrels or any small game, as the leather adjusts itself to the size of the object inserted and the game cannot be lost.

Ridge Pole Clothes Hanger

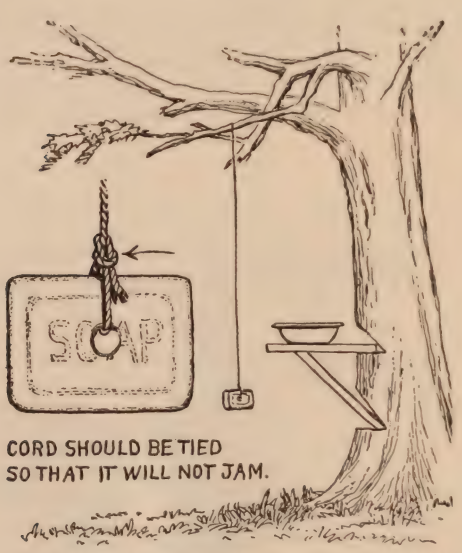
A clothes and hat hanger for the tent ridge pole can be made as shown in the accompanying diagram. The hanger consists of a section seven inches long cut from a two-inch sapling, nails being driven into the sides for hooks. The upper end is grooved and a rope tied around it and



slung over the ridge-pole. I have found this very convenient, and if the bark is left on the sapling the effect is rustic and in harmony with camp life. I consider this an improvement on the fir sapling with short branches in place of the nails as the evergreen trees are apt to exude pitch and spoil one's clothes.

"Non-skid" Soap

By making a small hole through the center of the cake of soap, a string can be tied to it and attached to the limb of a tree or the ridgepole of a tent near the washing place. The drawing also shows a convenient way to rig up a wash-stand in camp. Here is where the Nessmuk axe comes in handy. Cut two notches in a tree



ARRANGEMENT OF OUTDOOR WASHSTAND.

trunk so that the flat of the notch is horizontal at the base; brace a thin piece of board or a flat slab of cedar in each notch as pictured and drive them into the notches until they are steadied against each other. You will not need any nails if the notches are cut clean and deep enough. Place the wash basin on this shelf, hang up the soap on a convenient limb, and there is no excuse for anyone coming to dinner with dirty hands.

Camp Grate

A simple take-down grate for camp use can be made by using three pieces of iron about fourteen inches long by 1 inch wide to ¼ inch thick and three 5/16-inch iron rods. Bore holes about a quarter of an inch from the ends of the flat pieces of iron. Form them into a triangle and insert the rods, holding them in place with

Fig. 1

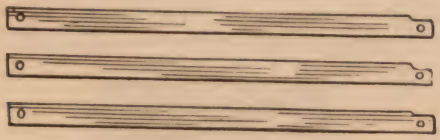


Fig. 2

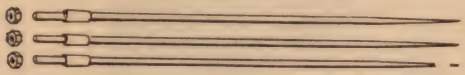
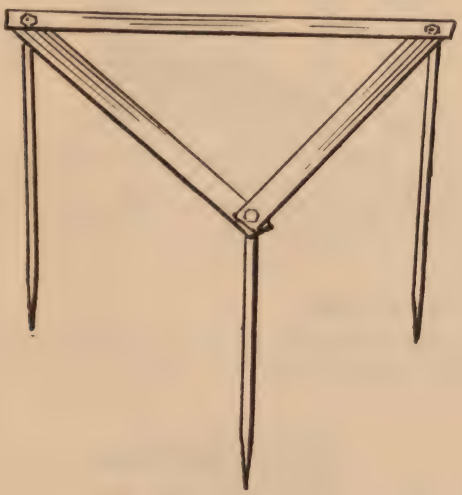


Fig. 3

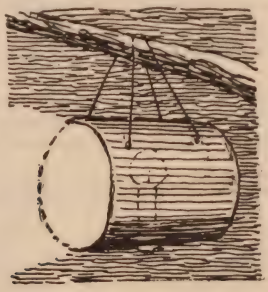


nuts. Figure 1, shows the different parts of the grate before they are assembled and Figures 2 and 3 the method followed in putting them together. Sharpen the rods

so they can be readily pushed into the earth around the fire.

Lamps for Emergencies

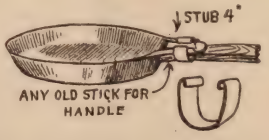
Campers and others may be interested in this lantern; if you have lost your carbide lamp this will do in an emergency. Take an ordinary tin can in the side of which a candle has been fixed, next punch four holes at opposite points, at the top, place wires at the opposite sides for a support. The bright tin of the interior will reflect the light admirably. If you do not like



this idea you might try this one. Puncture a can plentifully with holes, next make a hole at the bottom for inserting candle, handle may be attached by shoving wire through holes on opposite side near the top; a lid for this tent light gives a bit more brilliancy.

Frying-Pan Handle

If you find the handle of your frying pan heats up so quickly it is impractical over an open fire, take a ten-

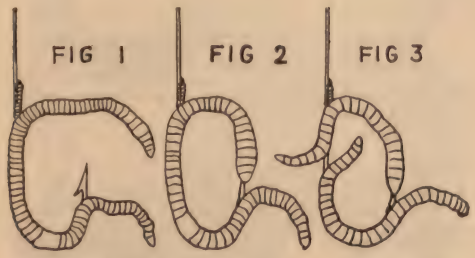


cent ten-inch frying pan, and cut off the handle, leaving a stub 4 inches long. Shape as illustrated a strip of

sheet-iron ¾ inches by 4½ inches, so that the end hooks under the stub, and is held in place by the strip of shaped iron hooked onto the frying pan flange. The wooden handle will not get he't up, and a little manipulation will teach you how to keep it from charring.

Snagproof Hook

For fishing slow brush streams, a hook may be used without a sinker and allowed to float with the current into the corners where the big ones live. It will not get snagged if baited as shown in the picture. Impale the worm about an inch and a half back from the head (Fig.



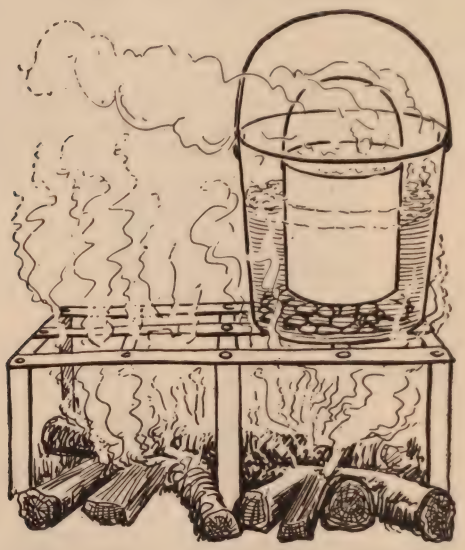
THE BAITED HOOK MADE SNAGPROOF.

1) running nearly to the tail. Then place the head of the worm on the point of the hook past the barb. If the hook is pulled back gently the bait acts as a weed guard. If small worms are used, place the bait as shown in Figure 3.

Camp Boiler

A cleverly constructed "double boiler" for camp use can be put together with no extra expense and is guaranteed to prevent the disappointment of scorched "bean soup" or other food, even with a fierce fire underneath. The accompanying illustration shows a small pail

containing the mixture to be cooked is set inside a larger pail containing water and a few pebbles of equal



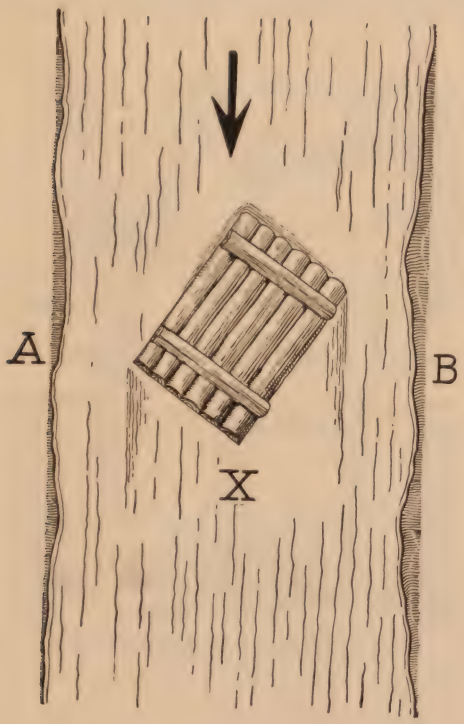
size, which serve to keep the bottoms separate. The cook may safely trust this double boiler as long as water is kept in the larger pail.

Crossing a Stream on a Raft

When using a raft to cross a swift river first choose a place that is free from rocks. Then lead the raft upstream at an angle of 45°.

By paddling on the downstream side of the raft the force of the current, acting against your efforts, will serve to carry the raft nearly straight across. The arrow shows the direction of the current. A is the starting point and B represents the place you want to land at. You must stand on the raft at the point marked X. By

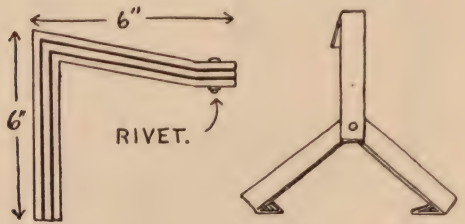
keeping the raft in this position the force of the current will help to carry it across. If you head the raft directly across, the current would carry you too far down on the other side.



Handy Folding Stove

A handy little folding stove that is not bulky and easily goes inside the saucepan with the cups is made as follows: Take three pieces of iron each 12 inches long by

1 inch wide by 1/16 inch thick. Bend at right angles in the center and put a small bend at one end as shown in the diagram. Then rivet these ends together. The small bend prevents the rivet head from setting up high and causing the pan to set unsteadily on the stove. In using this stove a good bed of coals should be prepared, or if you have a large camp fire for warmth or comfort, rake out a good bed of coals at one side of the big fire, plant



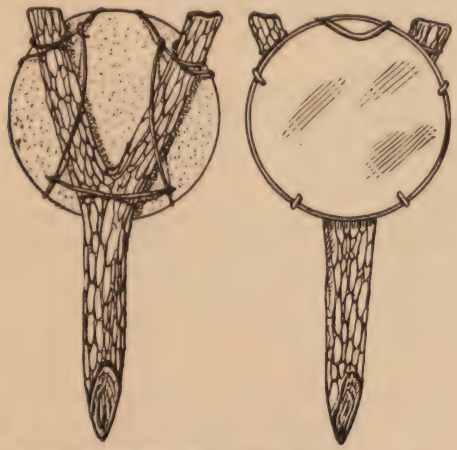
STOVE CLOSED. TOP VIEW OPEN.

SIDE VIEW OPEN, READY FOR USE.

your stove over it, and proceed to cook the dinner without roasting yourself. This stove sets solid and is in no danger of tipping over and spoiling the result of a day's fishing. It can be used to hold a broiler, a frying pan or a coffee pot and serves its purpose as well as a high-priced store article.

Handy Camp Mirror

This kind of mirror may not reflect all your beauty, but it will serve and cannot be broken. It is made from the bright cover or bottom of a tin lard pail mounted so as to be handled to advantage as shown in the accompanying rough sketch. An ordinary five or ten cent mirror or even your very best one may be used in the same



BACK VIEW SHOWING THE WIRE FASTENING. FRONT VIEW, READY FOR USE.

way. Cut a small forked stick with a handle easy to grasp—one with slightly rough bark is better as it will not slip out of wet hands. Then fasten the mirror firmly to the fork of the stick with wire as shown in the diagram. Sharpen the lower end of the handle so that it can be readily shoved into the ground or stuck into a crevice in the bark of a tree, which will give the camper a good stationary mirror for shaving or other use. You can also drive two small nails into the tent pole just wide enough apart to hold the handle of the mirror, and slip the mirror in when you need it for dressing.

Directions in the Woods

There is nothing more important to the woodsman than to have an infallible method of telling directions—points of the compass—when in the woods. When the sun is shining no one should have any difficulty in getting his directions, especially if he has his watch. If the sun is not shining, it takes the most dense clouds to prevent the casting of a shadow of a small knife blade, if held point on the thumb nail upright and slowly rotated until the thinnest shadow is cast on the nail. This will give the direction of the sun at any time of day, except on rarest occasions.

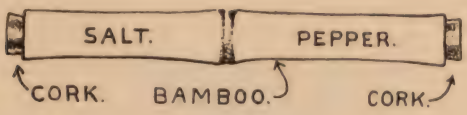
It is of these rarest occasions I would write. We have all heard of telling the north point by noting the moss on the trees; but if anyone were to attempt this by inspecting any single tree, as most would do, he would soon be hopelessly bewildered. So to determine the points of the compass by the moss, seek a place where the wood seems to be of equal density in all directions. Then extend the arms at right angles from the shoulders and slowly turn around, looking out into the woods. It will soon be noticed that in one direction the woods look *light* and in the opposite direction they look dark. Try this several times until you are certain they look the darkest, and stop. You will be facing the south because moss is darker than the bark of the trees and it is densest on the average on the north side of the trees. Hence your right hand will be pointing to the west, your back to the north and your left hand to the east.

This will certainly give your directions closer than one can walk a line indicated by an ordinary pocket compass. This is especially valuable in monotonously level country where there are no high points for observation. I have never seen this method in print and know of no one using it except myself and a few of my friends, and we rely on it absolutely.—*Dr. Pelten.*

Unbreakable Condiment-Holder

To make a condiment-holder that is unbreakable, noncorrosive, and will not spill the contents among other foodstuffs select a smooth piece of cane or bamboo and saw the rod across in two places about two inches from

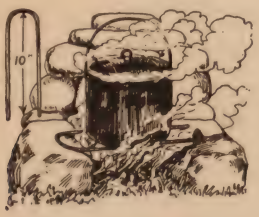
a joint in the wood. This gives two cells of equal size, as the joint extends across the cane and forms a partition. In one cell put salt and cork the end tightly with



an ordinary cork; put pepper in the other cell and close with a tight-fitting cork. You have to try this contrivance to see how really handy it is.

Simple Camp Grate

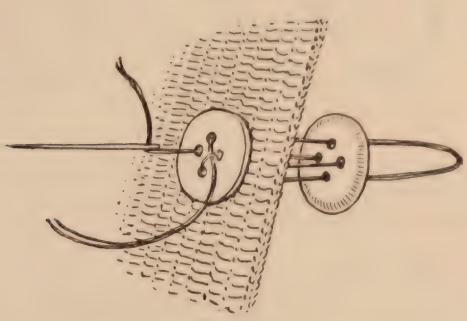
The simplest form of camp grate or pot rest is a round iron rod 3/16 by 24 inches long, shaped like a letter U—4 by 10 inches. With the ends resting on two big stones, you have a grate good enough for all ordinary cooking purposes. If there are no stones, dig a shallow trench



and lay the grate across it; or it can be placed across two logs. In windy weather, to get the most heat out of your fire, build a stone grate-back on the side of the fire opposite to that from which the wind is blowing. It reflects the heat back onto the pots, and makes the cooking quicker and steadier.

Sewing Buttons on a Sweater

It is hard to make a button hold for any length of time on a knitted garment that is in constant use. Buttons pull through and cause the garment to ravel out.



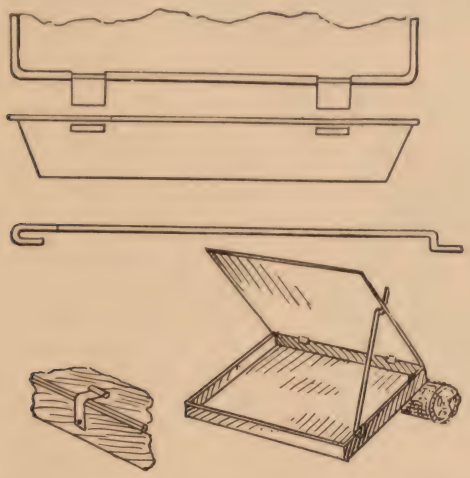
SHOWING METHOD OF SECURELY FASTENING CORD TO HOLD BUTTONS.

A simple way to overcome this annoying tendency is to thread a darning needle with cord and wax the two ends together with beeswax, which should always be in the ditty-bag. Then cut a piece of leather about the size of the button, rawhide is good, and punch four holes to correspond with the holes in the button. Place this leather disc on the inside of the sweater, opposite from the button. Run the needle through each hole—once is enough if heavy doubled cord is used—then pull taut and tie on the inside with a square knot.

Handy Baker

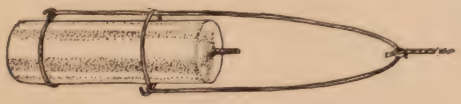
Purchase a heavy tin baking pan such as can be obtained in any hardware store. Fashion a cover from a piece of sheet tin and fasten it to the pan by means of the simple tongue and slot hinge, as shown in cut. Brace the pan before the fire by means of a log or stake and, adjusting the cover to the proper angle, hold it in place

by means of a wire. The pan will come in handy to carry odds and ends of your camping outfit and when fastened shut by a little catch will keep the contents snug and tight.



Candle Holder

If you have ever pitched camp near others you know how telltale shadows are often cast by lights placed on tables—to say nothing of these lights being in the way.



WIRE CANDLE HOLDER

An overhead light casts no shadows on the tent walls and can be quickly made with the aid of the contents of the ditty-bag. Every experienced camper carries a ditty-bag and can make any article in it take the place

of two or three carried by those who are not used to makeshifts. From the old "buckskin pouch" take a strand of wire about 3½feet long—brass or copper, either one will do. Make a little hook at each end and shape it around the candle as shown in the diagram. Suspend this from the ridgepole at a convenient height by tying a cord of sufficient length to the wire loop.

BOAT BUILDING

Building a Boat in Three Hours

Take some good hogshead hoops; select the best one; and then taking two strips of boards fasten them to the keel loop, which has been opened out to form a backbone, bow and stern, to keep it upright. Get about thirty good barrel hoops and tie them all along with stout tarred twine to the keel hoop, and two more hogshead hoops, which are tied one end of each to an end of the keel hoop, and then bring the other ends round, tie them to the other end of the keel—this makes the side or rail. The ends or tops of the barrel hoops are next tied to these rail hoops. This produces a skeleton complete. Paste old newspapers together and lay them on the skeleton to get a good pattern, and cut some heavy twilled bed-ticking to fit and have it sewed together. This cover is put on and over the frame, painted and dried in the sun.

Canvas Canoe

The ribs and long strips are made of oak ⅞ by scant ¼ inch; the ribs are placed 5 inches apart, and there are six long strips on each side, and two more 8 feet long to fill up the larger space in the middle. Where each strip and rib cross they are clinched together with a copper nail. The gunwale strips are ⅞ square and each rib is let into them and nailed with two copper nails. Use just 4 yards of 52-inch canvas, and the pieces taken off each end make the deck. Bring the canvas over the dado in the stem and stern, and put in a spline; then put on a keel made of oak outside of the canvas and screw it to the center keelson. The cockpit is made of ½-inch black walnut screwed to the gunwale strips, and has a piece ½ by 1 inch screwed on top on the sides and back, so that it leaves ½ inch projection. In front use a piece ½ inch by 3 inches. The seat is made of two ⅞-inch pine pieces, 3 inches wide, screwed to the ribs, and the

top is rabbeted ½ by ½, and the top is made of 2-inch by ½-inch pine strips placed 1 inch apart and cleated together. The deck is raised 1 inch in center of boat, so that it sheds the water, both sidewise and endwise. Bring the canvas around the boat and nail it on top of gunwale, and the deck the same and then put a neat ½-inch half-round molding on top of the tacks, so as to make a neat job.

Paint for Canvas Canoes

One gallon boiled linseed oil, 2 pounds of beeswax, 1 quart of benzine. Cut the wax in the benzine, add to the oil; heat quite warm, and apply as long as the canvas will take it. It adds very little to the weight of the canoe, and one coat will last a long time. No. 10 duck is better than heavier canvas; the mixture will keep it very soft and pliable, and will stand some pretty hard knocks.

Waterproofing Canvas Boats

Boil 6 ounces hard yellow soap in ½ pint of water. Add ½ pound patent dryer and 5 pounds boiled linseed oil, and apply with a brush.

Paddles

An ideal modern single blade would be made of carefully selected spruce with an over all length of five feet six inches. A comfortable grip on top of a stout haft that continued down well into the blade with a sharp "beaver tail" on one side and a rounded subtraction of this construction on the opposite side. The lower grip and the beginning of the blade would be approximately the center of the total length. The sides or outer edges of the blade would be as straight as general lines would permit and the average width of the blade would be six inches. The shape of the bottom would be semi-circular on a wide arc. The thickness of the blade would taper to a nicely sharpened edge on the bottom and on the sides. A copper tip can be well worked on to the bottom edge that greatly protects the blade against splitting and puckering when used on shores and in rapids. The blades used for hunting, fishing, racing and sailing had better be without tips. If the blade is to be decorated, it should be

done before any varnish is put on the wood, as in this way the colors will be better preserved and remain richer. Only outside spar varnish should be used as a coating.

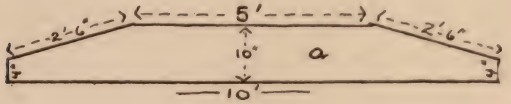
Here are a few paddle hints, and it is hoped that the reader will find at least one new one among them. A black or dark green blade is best for trolling. It does not glisten in the sunlight nor frighten the fish as the plain varnished wood blade does. Keep the entering edge sharpened finely with your knife. This will help you to enter the blade in the water more cleanly and effect better paddling. Be sure that the paddle dip is kept well varnished as this will prevent the rotting of the wood. Bind with fish line and then varnish the section of the haft that comes in contact with the gunwale. It will save both woods from being "chewed up" and prove another notch toward noiseless paddling. Drill a quarter-inch diameter hole through the side of the paddle grip about in the center. This will come in handy as an eye for a tent guy rope when the paddle is used as a temporary tent pole. It will aid you in lashing the paddle carrying yoke or when lashing the paddles in the canoe when shipping. You can also hang the revarnished paddle to dry by means of this hole. Such a hole will not weaken the grip. If your paddle should break in the haft, do not throw it away. Cut the ragged edges away by means of a nice splice, then glue, rivet and bind with fish line. You will find the paddle quite as strong as ever. If the blade splits, lace it with copper wire or rivet it through copper bands.

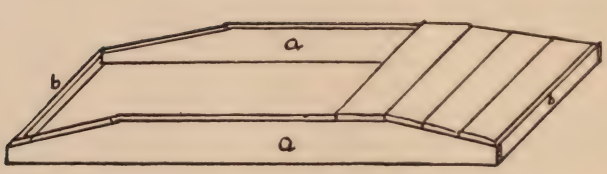
Should fortune dictate that you may no longer canoe, do not part with your favorite paddles, but rather hang them up in your den as precious trophies. They will serve more recollections of happy times than any photographs can hope to give.—Jule Marshall in *Forest and Stream.*

The Scow

The scow (Fig. 1), may be built in a few hours and at an expense of a few dollars. Boards of pine, spruce, or almost any wood can be obtained, 13 feet long, 10 inches wide and 1 inch thick. To construct a boat to carry two or three persons, four or five boards will be necessary.

Two of these should be selected and a length of 10 feet sawn from each. The edges of these pieces are now planed or "jointed" up straight and square to the sides, the latter being either planed or left rough. These two side pieces (*a*) are laid one on the other, and two or three small nails driven through them to hold them temporarily together, and the outline of the side is now marked on the upper one. The upper edge of the boat will be





SCOW.

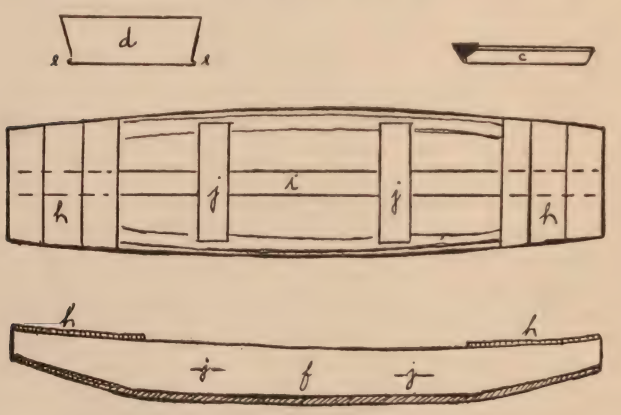
straight, the bottom will be straight for 5 feet amidships, and at each end for 2 feet 6 inches will slant upward until the end pieces of the boat (*b b*) are but 4 inches deep. The two boards are now sawn to shape and planed square on the ends and the slanting portions of the bottom, then they may be taken apart. Each end piece will be 3 feet long, or longer if a wider boat is required, and 4½ inches wide in the rough. The upper edges are planed up, and the sides are each nailed to the ends, using eight-penny nails, or ten-penny if the stuff is over ¾ inch thick. The frame is now turned bottom up, the two end pieces are planed on their

bottom edges to correspond with the bevel of the bottom, then a sufficient number of pieces to cover the bottom are sawn off the remaining boards. In this case they will each be 3 feet 2 inches long. Their edges are carefully "jointed up" straight and square, and they are nailed in place across the bottom. When all are nailed on, the ends may be planed down even with the sides of the boat. To stiffen the bottom a strip 5 inches wide and ¾ to 1 inch thick (see *i*, Fig. 2) is laid down the center of the bottom inside and nailed with wrought or clinch nails to each plank, the nails being driven through and their points clinched or turned in, using a hammer and an iron set. About 2 feet at each end will be covered with a deck, as at *h*, Fig. 2. One seat will be put in for rowing, being supported on two cleats, one nailed to each side. Iron rowlocks (cost seventy-five cents per pair) are better than wooden ones, but if they are not to be had, the latter can be made of oak. A cleat of oak 1¼ inches thick, 2 inches deep and 9 inches long is then screwed along the inside of the gunwale. In each cleat two mortises are cut, 1½ inches long, ½ inch wide and 3¼ inches apart. The rowlocks are each 7 inches long, ½ inch thick, 2 inches wide above the cleat and 1½ inches wide in the mortises, projecting 4 inches above the gunwale and 3 inches below. If all the joints are neatly made, the boat should be tight after being in the water a short time; but it is always best to paint or tar the entire boat, inside and out, preserving the wood and lessening the chance of leakage. In no case should caulking be needed in a new boat. If the builder desires, each edge can be painted as the board is put in place, which will still further prevent any leakage.

The Punt

The punt, as it is commonly called (Fig. 2), is a scow of rather better design than the one described above, but the operations of building are similar. Such a boat may be 14 to 16 feet long, 4 feet beam at gunwale, 3 feet 4 inches at bottom, and the sides 14 inches deep. The sides (*f f*) will each be a little longer than the length

of the completed boat, 14 inches wide and ¾-inch thick. They should be free from knots and sap wood, and as nearly alike as possible, so as to bend equally. One is laid on two benches, the outline of the boat is marked out as shown, the ends sweeping upward in easy curves, and it is sawn and planed to shape. It is then laid on the second board, the two are lightly nailed together, and the latter planed to match, a center line being marked on both while nailed together. The two end pieces (*c c*) are next sawn out of 1 inch oak or ash, the ends being beveled, as the bottom of the boat throughout will be



PUNT

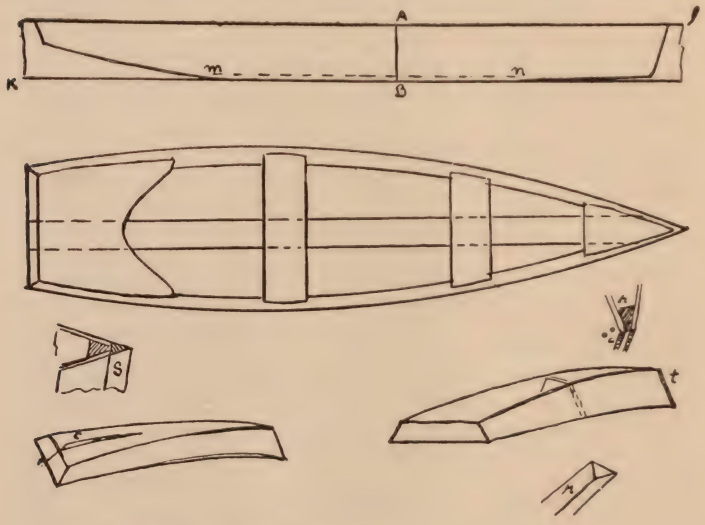
narrower than the top. Next a piece (*d*) 14 to 16 inches wide and 4 feet long is sawn off and the ends beveled, making it 4 feet long on the upper edge and 3 feet 4 inches near the lower. The two small projections (*e e*) are left, to aid in setting the side correctly. This board or mould is placed on edge, one side board is laid in place against it at the center mark, and a few nails are driven through the side board into the end of the piece. Now the other side is fitted in the same manner. The three pieces resting on a level floor, the corresponding

ends of the side pieces are drawn together with ropes until the end pieces will just fit between, then the sides are nailed or screwed to the ends. The best way to do this is to bore the holes and fit each side in turn to its corresponding end piece, putting in the screws before the sides are nailed to the mould (the pieces after fitting being taken apart); then when the ends are finally in place there is no trouble in holding and adjusting them, the screws being reinserted in the holes already bored. When sides and ends are well fastened together, both of the frames should have the same degree of curve, and the entire frame should be true and symmetrical. The lower edges of the sides having been planed square, now require to be beveled slightly, on account of the outward flare of the sides. To do this a piece of board, one of those cut for the bottom, is laid across and used as a guide, the outer corner of each edge, both of sides and ends, being planed off until the board lies flat across all the edges. The bottom boards are now cut to length and nailed in place, the edges of each being very carefully planed up to fit its neighbors. When the bottom is on, the ends are planed off even with the side of the boat, it is then turned over and a strip (*i*) 5 inches wide is nailed down the middle of the bottom, as in the previous boat. This strip will be 1 inch thick at its center, but toward the ends it may diminish to ½ inch, so as to bend more easily to the curve of the bottom. When it is in, the ends are decked over for 2 or 3 feet, as at *h h*. Two thwarts or seats (*j j*) will be put in, each 9 inches wide and 1 inch thick. They should be placed about 7 inches below the gunwale, and each end will rest on a short piece nailed to the side of the boat, long enough to reach from the bottom to the wider side of the seat. The seats should be secured well to the sides, as they serve to stiffen the boat. A gunwale strip is usually run around the outer edge. It may be of oak ¾ inch wide and 1½ inches thick, screwed to the side pieces. Rowlocks and stretchers complete the boat. It will, however, be easier to row straight if a skag be added to the after end. A stern post of oak, 1x1¼ inches, is nailed down the center of the end, and in the angle between it and the bottom is fitted a piece of 1-inch board (*o*, Fig. 3) nailed to it and

the bottom. On the stern post a rudder may be hung if desired.

The Skiff

In this boat the after end is similar to the previous one, but the bow is very different, resembling more a round-bottomed boat. The sideboards are marked and cut as in the former boat, but at the fore end they are not cut up at all, but are sawn off at a slight bevel to fit the



SKIFF OR BATEAU ——.

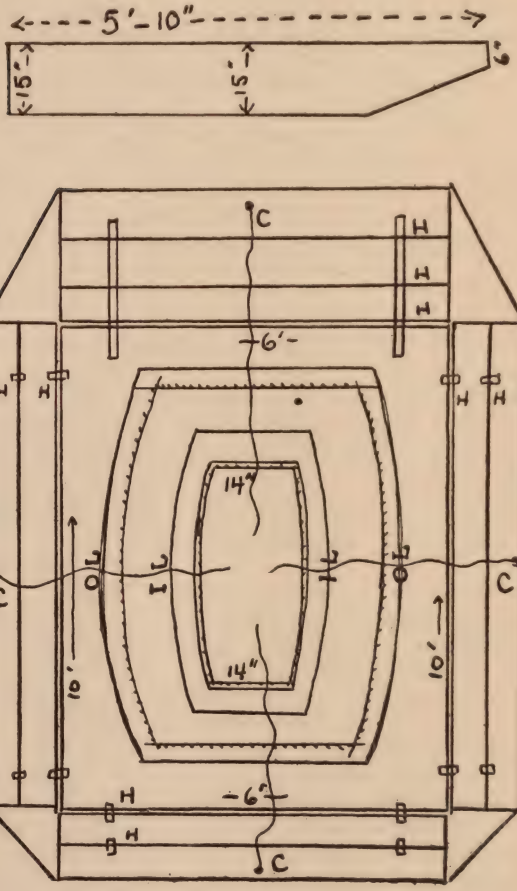
forward rake of the stem (*k l* shows the sideboard in the rough, with the side marked out). The gunwale will have a slight sheer, part of it being due to the bending of the sideboards, but to increase it the upper edges are made a little hollow, their concavity being from 1 to 2 inches, according to the sheer desired. A middle mould is cut out similar to *d*, and also a stern piece, the latter of 1 inch oak. It is fitted and screwed to each sideboard in turn, then it is taken off, the sideboards are nailed to the

mould along the lines A B, and the sternboard is replaced and screwed fast. Now the two sides are drawn together with a rope at their fore-ends until they nearly or quite meet, as at *t*, and a piece of oak of triangular form (*r*) is cut to fit in the angle between them, and they are screwed fast to it. The bend of the sides will cause the bottom of the boat to have considerable rocker, usually much more than is desirable. To avoid this, when the frame is thus far completed, the bottom edges of both sideboards are planed down from *m* to *n*, until the bottom is straight for some distance amidships. This can best be determined by setting the frame, top upward, on a level floor. When the edges are planed off equally they must be beveled, as in the preceding boat, the floor is nailed on, the middle piece is put in and nailed down, and the thwarts put in. Both in bow and stern there will also be seats at about 3 inches below gunwale and of the shape shown. To complete the bow, the ends of the sideboards are planed off, and another triangular piece of oak (*s*) is sawn out and nailed against the ends and the piece *r*, as shown, making a sharp bow. A scag (*o*) is also added, wale strips are put on, and the boat is ready for painting. Such a boat may have a centerboard, and may also be fitted with sails in the same manner as an ordinary round-bottomed boat.

Sinkboat

The dimensions, material, etc., to be used in constructing a sinkboat are as follows: The box in platform should be made of ¾-inch best white pine; or, still better, white cedar, if to be had. The ends of box should be of white oak, 1½ inches thick. The box should be 5 feet 10 inches long, in the clear (this will accommodate any man not over 6 feet in height, as both his knees and neck are bent in lying in the position to shoot), 15 inches deep in clear and 22 inches wide, sides straight perpendicularly, but sprung together at ends to 14 inches at head and foot. The simplest way is to make the box the same depth all over, but it is by no means the best way. The foot should be of full depth, viz., 15 inches. Cut away the head of box to, say, 6 inches, because the shooter, in lying down, has to have his eyes above the level of the box in order

to watch the flight of the fowl, so that very little depth is required at the head. The box should be put together



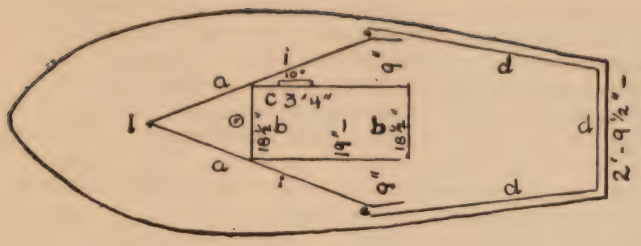
in the very best manner, as on its being perfectly tight depends the comfort of the shooter. Make a ½-inch drain board to be in bottom of box, and the sink is com-

pleted so far as the box is concerned. Around the box is built the "platform," as follows: Have two oak carlings cut out 6 feet long, 1¼ inches thick and 2½ inches wide in the middle, tapering off to about 1¼ inches at ends with 1 inch spring or 1¼ at most. Bolt these securely to ends of box, 1 inch below the top. You are now ready to put on the platform or deck. This should be of ¾-inch white pine or cedar, 6 feet wide and 10 feet long, the seams of the deck to be well fitted together and especially made tight where it fits round the box, which will project above the deck ¼ inch. On each end of deck nail on a batten of ½-inch strip, 3 inches wide, on under side of deck. At the head of platform is the head wing, which should be made of three 3¼-inch pine or cedar boards, each 12 inches wide, and fastened together by strong iron straps, with hinges at each board, and also where the wing joins the platform. These hinges should be so arranged as to give the board composing the wing free play to swing down at right angles with platform, and to fold back on top of same; tack loosely so as not to interfere with swing of wing strips of heavy drill or duck (of color as nearly resembling as possible the water the boat is to be used in) over each crack between wing board and between inner wing board and platform. This completes the head wing. Side wings to be of ½-inch pine or cedar boards, two on each side, each board 8 or 10 inches wide and connected together and with platform by three heavy sole-leather hinges in such a manner as to give free play with platform with the strips of drill or duck nailed over the head wing. In addition to the battens nailed under the platform there should be one on each side of box amidships on under side of platform, which should be braced to box by an iron ell. The ends of all these battens should project beyond the sides of the platform about an inch, so that the side wings will have something to rest on, as the leather hinges must be long enough to let them fold over the foot wing when the boat is folded up. The foot wing should be made like the side wings, extending across the foot of box, or a single board 14 to 16 inches wide can be used at foot. Connecting the wings at each of the four corners are triangular pieces of lead-colored duck, or heavy drill, tacked to the wings and having a

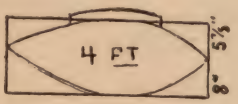
stout cord sewed to their outer edges; on cord use small corks to keep the corner pieces on top of the water as much as possible. The leads consist of two rows of sheet lead from 4 to 5 inches wide, the inner row to be tacked round the edge of box along the inner edge of the lead in such a manner that the outer edge can be bent up to keep the sea out. The outer row of lead is nailed round the platform half way between the box and the edge of the platform all round. Paint box, platform and wings as near the color of the water in which the box is to be used as possible. The sink is to be moored by two anchors, one at the head and one at the foot. For head anchor two holes should be bored at head carling, about 15 inches from each end, and a rope knotted through these holes, making a "bridle" about 10 feet long. The anchor rope should be made fast to the bight of this bridle. This lets the head of box ride free in a sea. For stern anchor bore a hole in the platform near the edge at foot and let the anchor rope pass through this. This enables the shooter to trip his stern anchor (which should be a light one) in case of a sudden shift of wind so that the box will swing head in. At Havre de Grace they use a light frame for side and foot wings, with drill or tickings stretched over them. These platforms are generally larger also, the usual dimensions there being 12x7 feet, but the board wings are better than canvas or drill, and the 6x10 platforms quite large enough. In the above sinkboat about 200 pounds of weight in addition to the man will have to be used. Have iron decoys cast, each weighing from 25 to 30 pounds. These are set in the platform with wooden decoys of about one-third the usual thickness. The bodies should not be more than 2 inches high and flat on the bottom. Use also light wooden decoys on wings with a "stool" of about 200.—*"Sinkboat" in Forest and Stream.*

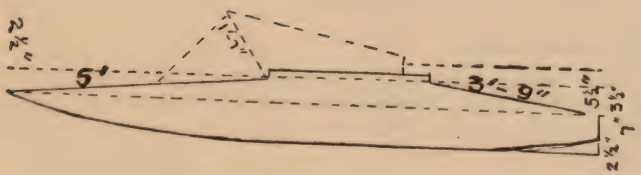
Sneak Box or Barnegat Duck Boat

Length, 12 feet; width midships, 4 feet; width of stern, 2 feet 9½ inches; depth of stern, 7 inches. Sprung timbers all of one pattern, $\frac{9}{16} \times \frac{13}{16}$ inch; distance apart, 8 inches; deck timbers natural bend, 1 inch$\times\frac{7}{8}$ inch. Cockpit, inside measurement: length, 3 feet 4 inches; width at bow



and stern, 18½ inches; amidships, 19 inches. Combing: height of inside at bow and stern, 2¾ inches; midships, 2 inches. From bottom of combing to top of ceiling, 13 inches. Trunk on port side, set slanting to take a 15-inch





board trunk placed alongside and abaft of forward corner of combing. Boards for boats, white cedar, ⅝ inch thick; deck, narrow strips, tongued and grooved. Rowlocks: height, 6 inches; from combing, 9 inches; middle

of stern, 4 feet 7 inches; made to fold down inboard and to fasten up with a hook. Stool rack runs from rowlocks to stern, notched at ends into fastenings of rowlocks, also notched at corners and hooked together, rest against a cleat on deck outside, and are hooked to the deck inside. In a heavy sea the apron is used. It is held up by a stick from peak to combing. Thus rigged the boat has the reputation of being able to live as long as oars can be pulled. The apron is tacked to the deck about two-thirds its length. The wings are fastened to the top and bottom of the rowlocks. Mast hole 2⅝ inches, 2 inches from combing. Drop of sides from top of deck, 5⅞ inches; deadrise, 8 inches. Over cockpit a hatch is placed. Everything connected with the boat is placed inside, gunners often leaving their guns, &c., locking the hatch fast. The boats sail well, and, covered with sedge, are used to shoot from. With the hatch on, a person can be protected from rain, and, with blankets, can be accommodated with a night's lodging.

Removing Paint or Putty

Take 3 pounds quick lime and 1 pound pearl ash and slake in water, heating until the mixture is about the consistency of paint. Apply with a brush and let stand about twelve hours, when paint or putty may be removed by scraping gently.

Pot-Leading Boats' Bottoms

Apply a thin coat of linseed oil, dust on the black lead powder and rub down smooth.

Bleaching Sails

One barrel salt water, 3 pounds chloride of lime, 2 pounds whiting, 3 pounds soda ash, 3 pounds salt. Scrub sails lightly with a broom on both sides and dry on the beach.

Boats in Winter

Always preserve your boat from the weather, especially on the sunny side. Tack or lash old canvas, burlap or matting around. Keep her clear of the mud and wash of the tide, or keel will rot away. Sweep snow off her

decks. Air below during fine days. Stop all leaks that may develop about the bits, partners, bolts, etc., as the wood dries. Haul out clear of sheds and shanties, and insure for fire. Comb up all lanyards. Stow sails and gear where they will not mildew and out of the way of rats, mice and thieves.

Spars in Winter

Slush down with mixture of white lead and tallow and put under cover.

Ropes and Rigging

A rope is composed of threads of hemp and other fibrous material. These threads are called *yarns*. A number of yarns twisted together form a *strand;* three or more strands twisted together form a rope. A rope's *bight* is any part not an end. A boat's *rigging* is made from ropes. *Standing rigging* is that which is stationary, like shrouds, stays, etc.; *running rigging* refers to ropes that run through blocks, like halliards and sheets.

Sailors' Knots—Two Half Hitches

Pass the end of the rope around the standing part and bring it up through the bight (one half hitch). Take it around again for two half hitches.

Square or Reef Knot

Take an overhand knot around a spar; take an end in each hand and cross them on the same side on which they came up; pass one end round the other and bring it up through the bight. If the ends are crossed the wrong way it will be a "granny" knot, and will not hold.

Timber Hitch

Take a turn of the rope around a spar, lead the end under and over the standing part, and pass two or more round turns around its own part; pass the first turn *over* the end part instead of through the bight, as in a half hitch.

Sheet Bend

Pass the end of a rope up through the turn of another, round both parts of the other and under its own part. This does not jam, and is the best knot that we know of for tying together two ropes of different sizes, or a chain to a rope.

Anchor Knot

Take two turns around the ring with the end of the rope; hitch the end around the standing part and through both turns, and then pass the end over the second and under the first turn.

Sheep Shank

Make two long bights in a rope which shall overlay one another; take a half hitch over each end of the overlaying part with the standing part which is next to it; used to shorten a rope, the mainsheet, for instance, temporarily, the whole being cast off to full length instantly by a sharp pull on any of the bights where they overlay.

Care of Ballast

To keep ballast clean remove every season, scrub and whitewash with hot lime or coat with red lead. Clean and red lead the hold, or use mixture of two-thirds Stockholm tar and one-third coal tar boiled together. Never stow ballast on the raw wood.

Starboard and Port

Starboard refers to anything appertaining to the right-hand side of a boat, the observer loking toward the bow. *Port* refers to the left-hand side. When the boat is under way and a wind is blowing these terms are generally replaced by *windward* (the direction from which the wind comes) and *leeward* (the direction to which the wind goes.)

Parts of a Sail

Of fore-and-aft sails, such as are used on all small sailboats and yachts, the *head* of the sail is that part fastened to the gaff; the *foot* is fastened to the boom; the *leach*

extends from the end of the gaff to the end of the boom furthest removed from the mast; the *luff* extends from gaff end to boom end nearest the mast, to which it is generally fastened by hoops; the *clews* are what a landsman would call the "corners" of the sail, and the clew at the luff and foot of the sail is sometimes called the *tack*. The jib has but three clews.

Heaving the Hand Lead

Grasp the lead line about a fathom from the lead, swing it to and fro and then launch it out so that it strikes the water in advance of the yacht's course. When the yacht is over the spot where the lead has been cast find the depth of water by holding the line perpendicular for an instant. The best position for casting is on deck forward of the shrouds, on the windward side. The ten fathom lead line is marked thus: At 1 fathom, a knot; 2, two knots; 3, three knots; 4, four knots; 5, white rag; 6, six knots; 7, red rag; 8, blue rag; 9, nothing; 10, piece of leather.

Ship Time

The day at sea begins at 12 o'clock noon, when eight bells are struck, by sets of twos, *one, two* rapidly following each other, then a pause of 3 seconds, then *one, two* again, and so on. Three bells would be struck, *one, two —one;* four bells, *one, two—one, two.* At 12:30 P. M. one bell is struck; at 1 P. M. two bells, and one bell more every half hour until 4 P. M., when it is eight bells again. It is then repeated, the next eight bells coming at 8 P. M., the next at midnight and so on.

Watches.

The afternoon watch is from eight bells (noon) to eight bells (4 P. M.); then follows the first dog watch until four bells (6 P. M.); the second dog watch until eight bells (8 P. M.); the first night watch until eight bells (midnight); the second night watch until eight bells

(4 A. M.); the morning watch until eight bells (8 A. M.), and the forenoon watch until eight bells (noon).

Velocity of Wind

A "fresh breeze" blows 16 miles an hour; a "single reef" breeze blows 18 miles an hour; a "close reef" breeze blows 20 miles an hour; a "gale" blows 24 miles an hour; a "fresh gale" blows 30 miles an hour.

Grounding

If the yacht grounds upon a shoal and is left by the tide, get out an anchor at once to windward. Then, when the flood begins, the yacht will not be blown further on the shoal, but will soon ride head to wind or tide.

Buoys

In entering a harbor leave black buoys to port, red buoys to starboard.

Springing a Leak

When a yacht springs a leak pass a sail over the bows and lead it aft over the leak by means of ropes on both sides of the yacht. Then make for the nearest port at once for repairs.

Cement for Stopping Leaks

The rubber cement used for fastening bicycle tires is excellent for stopping leaks in canoes, either joint, cracks or holes; quite large holes can be fixed up with it for cracks or joints, with a hot iron or small stone. Melt and rub the cement well in, leave a small streak of the cement over the crack or joint. For mending a hole take a piece of canvas or boot leg large enough to cover the hole, with about one inch lap all around. With a hot iron or stone smear over the patch with a good coat of rubber cement, also smear around the edges of the hole, then heat the patch quite hot and press it in place. Then smear over the whole with cement, using the hot iron or stone. The cement will harden in a short time, when it will require no further looking after. This is for emergencies. To fix a hole permanently it should be cut out square

or oblong, with slightly beveling edges; then neatly fit a piece of wood to the hole, smear the edges of the piece as well as the edges of the hole with rubber cement; have it quite warm, then press the piece in place; if well done it will neither come out nor leak.

Sailing Rules

The "rules of the road" on the water are important to know. A vessel is on the starboard tack when the wind blows against her starboard side, and she has the right of way over a vessel on the port tack except when the latter is sailing close-hauled and the former sailing free, in which case the vessel on the port tack has the right of way. If two vessels have the wind blowing on the same side, the vessel to windward shall keep out of the way of the one to leeward. If two sailing vessels are meeting end on, the helms of both shall be put to port, each steering to starboard. A steam vessel must get out of the way of a sailing vessel. Every vessel overtaking another must keep out of the latter's way.

Lights on Boats

All steam vessels must carry at night, when under way, a white light at the foremast head, a green light on the starboard side and a red light on the port side; when towing other vessels a steam vessel must carry two white masthead lights vertically in addition to side lights. Sailing vessels under way must carry the same side lights as a steam vessel, but no white masthead light. All vessels at anchor must show a white light not more than 20 feet above the hull. Small or open boats must carry a lantern having a green slide on one side and a red slide on the other, and on the approach of other vessels must show the proper color on the side toward which the approaching vessel is coming.